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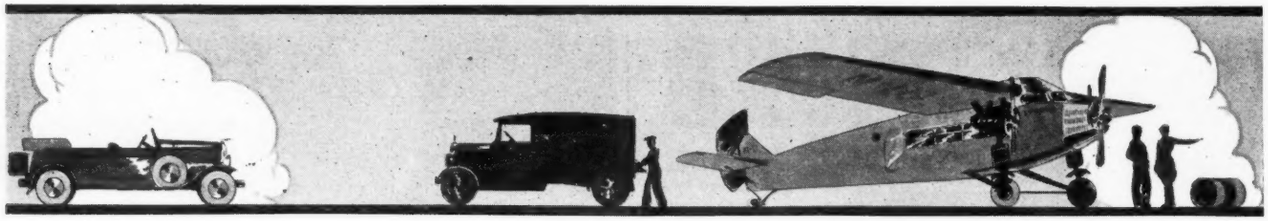

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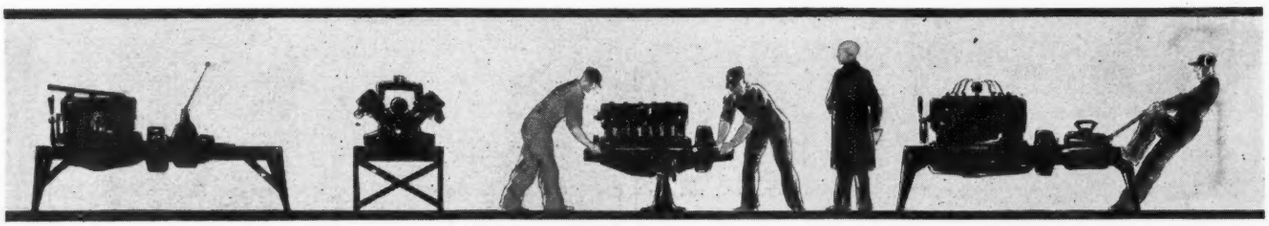


AUTOMOTIVE INDUSTRIES
VOLUME 59 *Philadelphia, Saturday, October 20, 1928* NUMBER 16

Cars *of* Eight Nations *on* View *at* British Show

26 American makes exhibited. Many new low-priced sixes shown by English manufacturers. Miniature four-passenger models gaining in popularity.

By M. W. Bourdon

Special Cable to Automotive Industries

A LARGE number of new sixes and eights, increasing popularity of miniature four-passenger models and the prevalence of fabric body-work are some of the notable features of the twenty-second Olympia Automobile Show which opened in London, Oct. 11 and closes Oct. 20.

In appearance many makes of sedans have been vastly improved over last year's offerings by higher radiators, lower chassis, sloping windshields, domed roofs and curved rear quarters. The sloping windshield is often accompanied by a reverse sloping of the rear panel, improving the aesthetic balance. Much brighter fabric colorings are in vogue and purchasers are offered a wider choice than ever before. Cellulose finishes appear more subdued, though duotone effects are frequently optional.

The show fully maintains its international character, the makers exhibited comprising 39 British, 26 American, 22 French, seven Italian, four Belgian, two Austrian, two German and one Spanish. A total of 579 cars are shown, including 163 by bodybuilders. Thirty makers show bare chassis. Parts, accessories and tires occupy 362 exhibits.

One of the highest-grade new cars at the British show is this Lanchester Eight with a fabric sedan body. It is classed as a speed model and sells for $8,600

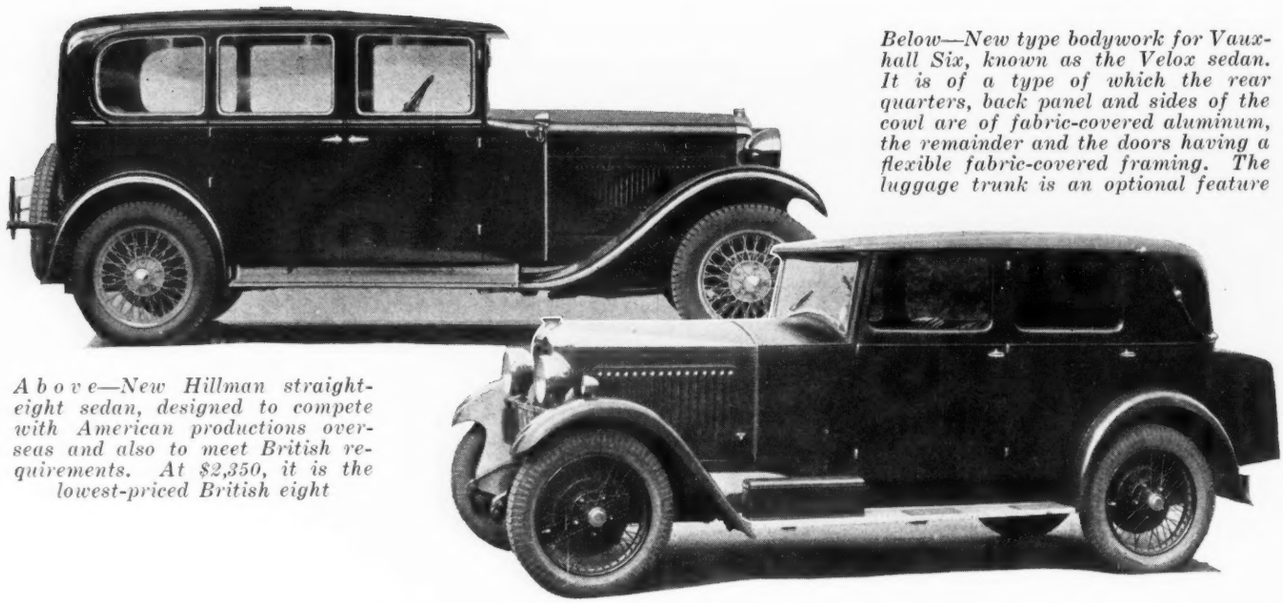
American makes exhibited are Auburn, Buick, Cadillac, Chandler, Chevrolet, Chrysler, Dodge, Durant, Erskine, Essex, Falcon-Knight, Franklin, Graham-Paige, Hudson, Hupmobile, LaSalle, Marmon, Moon, Nash, Overland, Packard, Reo, Stearns, Studebaker, Stutz and Willys-Knight.

The show indicates an increasing demand for fabric bodies of all types, especially sedans. Nearly every European maker is showing examples of fabric bodywork and several American cars are exhibited with British bodies of this type. At the same time a large pro-

EXHIBITORS at Olympia are keenly discussing the proposal not to hold the show next year. The Society of Motor Manufacturers is canvassing its members for opinions before deciding the matter.

Some favor holding the show every other year and others are for discontinuing it entirely. Very few want it continued as an annual event.

The general feeling among makers and dealers is that the show intensifies seasonal buying, prospects holding off after midsummer until the show, awaiting new models or anticipating price reductions. It is definitely asserted that the show does not increase total annual sales.



Below—New type bodywork for Vauxhall Six, known as the Velox sedan. It is of a type of which the rear quarters, back panel and sides of the cowl are of fabric-covered aluminum, the remainder and the doors having a flexible fabric-covered framing. The luggage trunk is an optional feature

Above—New Hillman straight-eight sedan, designed to compete with American productions overseas and also to meet British requirements. At $2,350, it is the lowest-priced British eight

portion of buyers still seem to prefer composite or metal body construction and a more or less general reaction in that direction is not improbable.

Sedans with sliding or folding roofs—"sunshine" models—are very numerous. Many of the new designs have interior operation, so that it is a simple matter to open or close the roof. Makers who are offering this type of body as optional found during the past year that it was preferred by 80 per cent of the buyers.

Six-window fabric sedans have displaced numerous four-window designs, or are optional at the same price. A prevalent new body style is a close-coupled sedan with two doors on each side extending from windshield to rear corner without the use of a central pillar. This is accomplished by fitting a very wide front door which closes on the rear one. Coupled spring bolts at top and bottom secure the latter.

Low-priced British and European sixes have invaded the field held exclusively hitherto by the small four. Many of these sixes are under 120 cu. in. piston displacement and several are under 90 cu. in.

The new eights are mainly expensive models, one notable exception being the 160 cu. in. Hillman "20," which is designed to compete with American products. The open five-passenger model is priced at $2,110 and a sedan, which is furnished with either fabric or sedan body, sells for $2,352. The car is of high-grade construction throughout, with servo braking.

18 New British Models

Over 40 new models of all nationalities are shown, including 18 British. Four of the latter are fours, nine are sixes and the remaining five are eights. The largest new four is a 90 cu. in. supercharged, front drive Alvis. The sixes include an 85 cu. in. side-valve Armstrong-Siddeley which shares with Renault the distinction of being the smallest and lowest-priced European six. Standard is showing a new 116 cu. in. side-valve, four-speed six with a sliding roof fabric sedan body priced at $1,596. The new Riley is an overhead valve six of 100 cu. in. displacement and has four speeds. The fabric sedan sells for $2,390. The metal sedan has a luggage locker concealed within the normal outline, a hinged rear panel providing access.

Wolseley, now a part of the Morris organization, introduces new overhead camshaft six and eight-cylinder designs which are larger than the former models. The eight has undergone the sharpest price reduction of the show, being cut approximately 25 per cent. Prices now are: 120 cu. in. six, $1,815; 160 cu. in. six, $2,060; 170 cu. in. eight, $2,665. Lanchester has an overhead camshaft, 270 cu. in. supergrade speed model eight to supplement its sixes, which are continued with few changes. The eight sells for $8,600.

Single Sleeve-Valve Aster

Other new British models include an Aster single sleeve-valve 192 cu. in. eight; a Beverley overhead-valve 166 cu. in. eight with Warner gearset; a Crossley 116 cu. in. overhead-valve, four-speed six; Humber 128 cu. in. overhead-inlet four-speed six. Seven of the 18 new British models have magneto ignition, nine battery, and two dual. Fourteen have four speeds. Six have overhead camshafts, eight use pushrods and three are of the side-valve type.

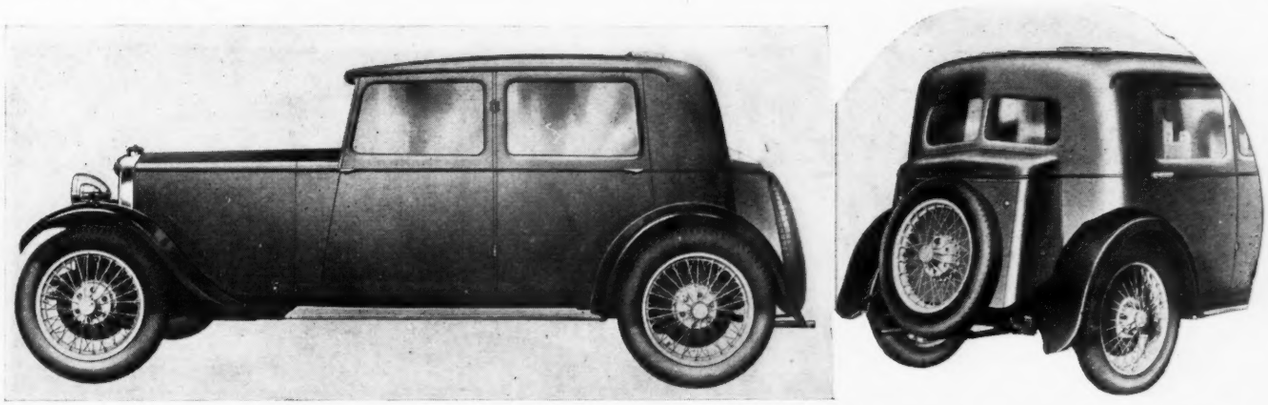
Prices on existing models generally show small reductions, none extensive except Wolseley, though Austin reductions run to 20 per cent and new fabric sedans in this line are 10 to 15 per cent cheaper than the continued metal types. English prices of French and Italian cars are slightly lower.

New models introduced at Paris and shown at Olympia include the Citroen Six, priced at $1,320 for the all-metal sedan with chromium plating.

Mercedes shows a new 282 cu. in. eight with side valves. Chassis is priced at $4,090.

Fabric bodies of nearly all makes are cheaper now than metal. Constructional methods still vary from fabric pasted on metal panels to genuine Weymann practice, though the latter has secured fresh adherents, some makers having dropped their own semi-flexible designs originally used. Fabric is being more extensively used for limousines, coupes, laudaulets and open models. Weymann shows fabric bodies in glossy finishes almost indistinguishable from lacquered metal panels. Several makers are introducing fabric-bodied four-passenger speed models with higher compression, larger carburetors and higher gears to displace the ordinary five-passenger job, owing to the fact that demand seems to be concentrating on sedans and speed models. The latter sometimes have sedan bodywork.

Pneumatic upholstery and wire wheels show marked increases. Safety glass is standard on several makes, but more often at extra cost. Servo braking has not



Fabric sedan of new Riley Six. Rear view shows integral luggage locker and distinctive rear window treatment

increased, the trend apparently being more toward self-wrapping shoes. Brake layouts have been noticeably simplified, with compensation almost defunct. Cam steering has increased, but ratios are no lower. Only one maker, Singer, has standardized on chromium plating, but others soon will follow suit. Meanwhile a number of makes may be had with chromium plating at extra cost.

Principal British demand is now concentrated on three types of car. First comes the miniature four-passenger open car or sedan at about $500 to $675; second, the 90 cu. in. fours at $725 to $1,200, and third, the 90 to 120 cu. in. sixes at $1,450 to $2,180. Exceptions are the continued popularity of the Morris and Hillman 14-hp. models. The Hillman four-cylinder sedan, selling for $1,570, doubled its output for the third successive year.

The new eight-cylinder Hillman, from the American standpoint, is of prime importance, for it represents a determined attempt to compete with American productions in the world's market in the combined attributes of price, performance, appearance and comfort. As regards performance, it is claimed to have a maximum speed in excess of 70 m.p.h., and to accelerate from 10 to 30 m.p.h. in 8 seconds on top gear and from rest to 50 m.p.h. in 23 seconds, using the four gear ratios in succession. It is the first British eight to be offered below £500.

158 Cu. In. Engine

The engine has a bore and stroke of 63 x 105 mm. (2600 cc. or approximately 158 cu. in.) and with a compression of 5 to 1 it develops 58 b.hp. at 3000 r.p.m. The unit cylinder block and crankcase is suspended at four points from the main frame with semi-flexible anchorages and supports the crankshaft in five bearings, the main journals being only one millimetre less than the cylinder bore, viz., 62 millimetres in diameter, which obviously implies a very stiff crankshaft, torsional vibration being further counteracted by a damper at the front end. Overhead pushrod-operated valves are used, set within the flat-topped combustion chamber, which has parallel sides and forms a continuation of the cylinder bore; the spark plugs are also overhead. The use of overhead valves is a new departure for Hillman, who hitherto has specialized in side valves and is continuing the latter in the popular four-cylinder 14 hp. model.

Battery ignition is used, the distributor being driven off the dynamo, the latter in turn being driven by a duplex roller chain, which also serves for the camshaft with automatic adjustment by a spring idler. Lubrication is forced to all points, including the overhead valve gear, the pump being set at an angle with its casing outside the crankcase and driven direct by helical gearing from the five-bearing camshaft. The oil pressure is 40 lb. per sq. in. Water circulation is by a belt-driven pump from an extension of the fanshaft, the belt being adjusted by means of a screwed flange on the driven pulley.

Two Downtakes in Manifold

A single carburetor delivers to a four-branch rectangular section induction manifold of cast aluminum, which has central contact with the flanged exhaust manifold, the latter being notable in having two downtakes, one at each end. The flywheel casing and four-speed-gearset with right-hand control form a unit with the engine and like the open propeller shaft and rear axle, are almost identical with these units of the four-cylinder model. The body space is identical with the latter, enabling the same range of bodies to be offered on a wheelbase which is only 6½ in. longer, viz., 120½ in.; 6½ in., therefore represents the sole addition to the chassis length due to the use of eight cylinders in place of four, in spite of which there is a water space between each cylinder in the block casting. The gear ratios are: Top direct 5 to 1; third 7.75; second 12.8; first 19.9; reverse 16 to 1.

Springs are semi-elliptics all around with shock absorbers and gaiters; detachable wire wheels are standard equipment with 29 by 5.50 Dunlop tires. The car shown at Olympia is a fixed head coupe with two exceptionally wide doors and fold-up seats behind the main seat.

The new six-cylinder Armstrong Siddeley is a type of car which, with the exception of the 12 hp. Renault, represents a new type on the British market, for with the exception mentioned it is the smallest six and is offered at a lower price than any other six-cylinder car, viz., £250 with a four-passenger body with folding top and detachable side screens. It will appeal to a class of buyer who hitherto has had to be content with four cylinders. Its side valve engine has a bore and stroke of 2.2 by 3.3 in., forced lubrication, magneto ignition and thermo-syphon cooling.

A single plate clutch is used, while the three-speed gearset follows Armstrong Siddeley practice in being mounted as a unit with the front end of the propeller shaft casing; the four-wheel brakes have direct operation, disk wheels with 27 by 4.4 in. Dunlop tires are fitted; the wheelbase is 105 in.; the track 48 in. and the overall length 156 in. The springing is by half-ellip-

(Continued on page 551)

Latest Welding Methods, New

Many Items of Direct Automotive Interest Disclosed During Technical Sessions and at National Metal Exhibit

By K. W. STILLMAN and P. M. HELDT

PROGRESS in development of high speed cutting tools, applications of new welding processes, developments in heat treating, and particular reference to the metallurgical problems of the aircraft industry, were among the outstanding features of interest in the period of concentrated study, discussion and exposition known as National Metals Week and held Oct. 8-12 in Philadelphia under the auspices of the American Society for Steel Treating, the American Welding Society and the Institute of Metals.

Both in the technical sessions and at the National Metal Exposition many items of direct automotive interest were disclosed. Advances in welding technic have been particularly applied to body building, while a number of new alloy steels with considerably greater cutting capacity bear the promise of sweeping changes in production processes.

Case hardening, non-rusting and stainless steels, the effects of nickel on cast and malleable irons, surface cooling of steels in quenching, new hardness testing methods, metallurgical problems of transmission gearing, new methods of heat treating high speed steels, and steel failures and the use of welding in aircraft construction were some of the subjects presented which bore directly on automotive problems.

Ernest F. Davis, Warner Gear Co., discussed the metallurgical problems arising in the production of transmission gearing.

Steel Failures in Aircraft

F. T. Sisco, chief metallurgist, Wright Field, in his paper on steel failures in aircraft, stated that poor manufacturing methods were almost as often the cause of failures as poor material. The lack of adequate fillets or improperly machined fillets is the greatest single cause of failure, according to Mr. Sisco's study of all the failed military aircraft that could be analyzed.

J. W. Meadowcroft, assistant works manager, Edward G. Budd Mfg. Co., discussed the development of welding in the production of all-steel bodies and, in particular, described the newly developed flash welding process which is replacing butt, spot and gas welding in the Budd plant to a large extent.

At another session of the American Welding Society, H. L. Whittemore, of the Bureau of Standards, presented the results of an investigation of methods of testing welded joints in airplane construction. The tests so far have not been conclusive but are to be continued. In this connection also H. H. Moss, Linde Air Products Co., read the tentative specifications which have been developed by a committee of the society, in conjunction with the Bureau of Standards, for aircraft welding procedure.

At the banquet of the American Society for Steel Treating, E. P. Warner, Assistant Secretary of the Navy for Aeronautics, prophesied that airplanes of the future will be made almost entirely of metal, but since he doubted that they would ever be made in quantities like automobiles, the consumption of metals for airplanes will not become a major part of the steel treating industry. The very great importance of reliable materials in all parts of an aircraft, however, make it necessary, he said, for the metal-working industries to continue their developments of alloys and other metals not only for peace-time progress but as assurance of adequate supplies in the unwelcome event of war.

At one session of the A.S.S.T. two papers were presented dealing with the effect of nickel on the structure of cast iron and malleable iron. J. R. Houston of the Harnischfeger Corp., Milwaukee, Wis., described some tests made to check up on the claim that nickel controls the combined carbon in cast iron. The largest percentage of the castings used by this firm require mixtures ranging from 1.50-2.00 per cent of silicon and having a total carbon content ranging from 3.60 to 3.75 per cent. The steel content varies from 10 to 40 per cent. It has been found that the metals containing the larger percentages of steel do not set more quickly and do not chill more on light sections if the pouring temperatures are equal and the silicon, sulphur, phosphorous manganese and total carbon are the same in all cases. The graphite structure and distribution are different, however. In all foundries in which several mixtures are used in a day's run, the fluidity and rate of cooling vary considerably, and this results in large variations in combined carbon.

The results obtained seem to establish the fact that as little as 0.30 per cent of nickel narrows the difference in combined carbon in 1-in. sections and ¼-in. sections to 0.10 per cent in the nickel-iron poured "cold," compared to 0.25 per cent in plain iron poured "cold," and that it actually reduces the combined carbon uniformly in all sections, indicating that that percentage

Steels are *Metals Week* Topics

AISLE F
AISLE E
Q ALLOYS
THE HOT TIME IN THE OLD TOWN TONIGHT
ALL WORKS Q ALLOY KEEPS TIME GOOD?
DOES THIS CONVINCE YOU?
HAVE A PEEP AT OUR HOT TIME
Q ALLOYS
Q ALLOYS Pots for Lead and Salt Cyanide Hardening
CARBORIZING BOXES
LEAD SALT CYANIDE POTS
RACKS RAILS FIXTURES
GRAFTON FOTO SERVICE PHILA.

¶ *General view of 1928 National Metal Exposition, held at Commercial Museum, Philadelphia, Pa.*

of nickel lowers the combined carbon by graphitization similar to the action of silicon.

H. A. Schwartz, research manager of the National Malleable and Castings Co., Cleveland, O., discussed the effect of nickel as an accelerator or graphitization of iron. One of the conclusions drawn from the results of the experiments is that in the presence of nickel in even rather low concentrations, silicon loses its effect as an accelerator of graphitization. The graphite formed by a given heat treatment is very nearly proportional to the nickel content. Another result arrived at is that the graphite formed at a given temperature is proportional to a power of the time lying between 2/3 and ¾, up to the point where 86 per cent of the possible total carbon formation has taken place. The temperature coefficient of the graphitizing rate was found to be similar when that rate is accelerated by nickel and when it is accelerated by silicon.

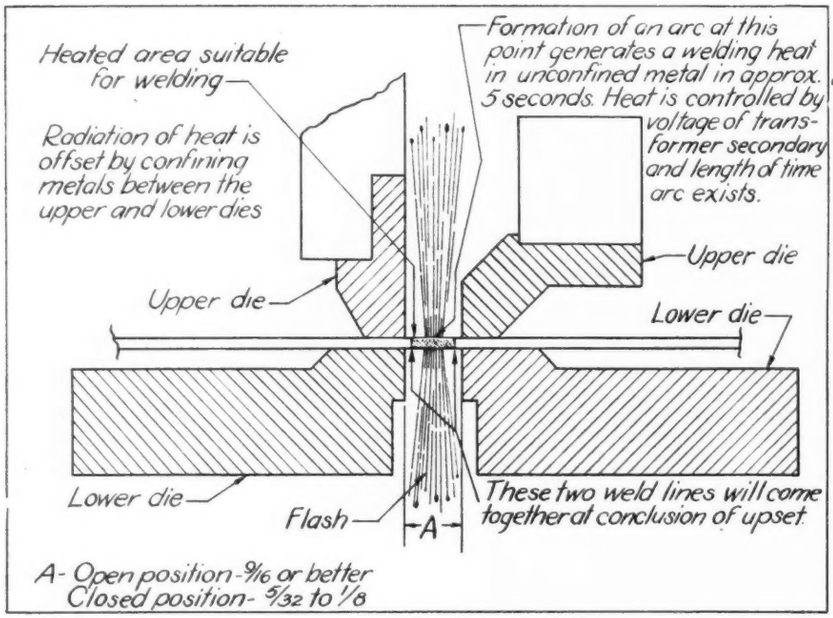
New Tool Material

S. L. Hoyt of the General Electric Co. read a paper on "Tungsten Carbide, a New Tool Material." The properties of this material are described elsewhere in this issue.

One session was devoted to case-hardening processes. Raymond H. Hobrock described experiments carried out at the Purdue University Engineering Experiment Station on the effect of supplying ammonia gas under pressure in the nitriding process. It was concluded from the results of the tests, that increase in pressure does not greatly change the time required to reach the maximum surface hardness; does tend to decrease the hardness of the surface if the treatment is continued for more than about 25 hr.; considerably increases the depth of the case; decreases the average hardness gradient, and permits of the establishment of a high hardness at almost any depth, depending on the pressure of the gas and the time of the treatment.

George M. Eaton of the Molybdenum Corp. of America discussed the problem confronting the testing engineer or inspector whose duty it is to find out whether a nitrided product possesses the characteristics which justify the expectation that it will perform satisfactorily in a given service. Mr. Eaton discussed in succession the file test, Scleroscope test, Brinell test, Rockwell test, diamond scratch test, Herbert pendulum test, Vickers diamond hardness test (all for hardness), as well as ductility tests by pulling thin wires, strips and tubes. One of his conclusions was that when the time comes that it seems to be essential to evaluate the proportional limit, ultimate strength, and modulus of elasticity of the nitrided case, the thin-walled tubular tension test piece offers the best means.

E. G. Mahin and R. G. Spencer of Notre Dame University described experiments in case carburization in which an ordinary carburizer was used in conjunction


Heated area suitable for welding
Radiation of heat is offset by confining metals between the upper and lower dies
Formation of an arc at this point generates a welding heat in unconfined metal in approx. 5 seconds. Heat is controlled by voltage of transformer secondary and length of time arc exists.
Upper die
Upper die
Lower die
Lower die
Flash
A
These two weld lines will come together at conclusion of upset
A- Open position-9/16 or better
Closed position- 5/32 to 1/8

Detail of die construction and operation used for flash welding on Budd all-steel bodies

with ferro-silicon, at higher temperatures than ordinarily used. By utilizing this method it was found possible to produce a deep case without a zone of free cementite, and to shorten the time required for completing the case carburization.

Prof. Oscar E. Harder of the University of Minnesota and Willard S. Johnson of the American Rolling Mill Co., presented a paper on "The Solubility of Carbon in Normal and Abnormal Steels." This is a continuation of a study of the same subject previously reported on before the A.S.S.T., longer carburizing times and different temperatures having been used in the latest experiments. The carbon contents of the cases produced were checked by chemical analyses. The results showed that for a given carbon content precipitation takes place in the abnormal steel at a higher temperature. It was also found that as the carburizing temperature increases the amount of carbon taken up by the normal and abnormal steels becomes essentially the same. The results seem to be consistent with the previously proposed mechanism of the formation of the characteristic microstructure found in abnormal steels.

Stainless Irons and Steels

Monday morning's session of the A.S.S.T. was devoted to subjects connected with non-rusting and stainless iron and steels, and four papers were presented and discussed, as follows: "An Investigation of the Physical Properties of Certain Chromium-Aluminum Steels," by Frank B. Lounsberry and Walter R. Breeler, Atlas Steel Corp., Dunkirk, N. Y.; "Chromium-Copper Steels as Possible Corrosion Resisting Ferrous Alloys," by B. D. Saklatwalla and Albert W. Demmler, Vanadium Corp. of America, Bridgeville, Pa.; "A New Development in Corrosion-Resisting Steel," by Frank R. Palmer, Carpenter Steel Co., Reading, Pa., and "Stainless Iron and its Application to the Manufacture and Transportation of Nitric Acid," by Walter M. Mitchell, Central Alloy Steel Corp., Massillon, Ohio.

Messrs. Lounsberry and Breeler decided to investigate the nature and properties of steels containing aluminum from about 2 to 6 per cent and chromium from about 7 to 13 per cent, with silicon and carbon up to 1 per cent, and to determine the effects of the addition to these aluminum-chromium alloys of nickel, cobalt, molybdenum, vanadium, tungsten manganese and copper.

Perfect forgeability characterized those steels having a total aluminum and silicon content of not more than 5.5 per cent, with silicon at a maximum of 1 per cent. Tensile and impact values depend primarily on the aluminum and silicon contents. With silicon at approximately 1 per cent and aluminum at 4 per cent or less, or with silicon decreasing to about 0.25 per cent and aluminum increasing to 5.2 per cent, normal values of good strength, ductility and impact were obtained. Aluminum or silicon in excess of the above values decreased the ductility and impact values. Tensile values at high temperature were exceptionally good.

Messrs. Saklatwalla and Demmler studied the effect of additions of copper on high-chromium range steels. The physical properties of chromium steels with from 12-14 per cent chromium were found to be better than those of 20 per cent chromium steels, and the increased chromium therefore would be justified only where there is need for great resistance to scaling. Copper-bearing chromium steels of the lower range fill a gap—with respect to corrosion resistance—between plain copper-bearing steels and ingot iron such as Armco, on the one hand, and high chromium and chromium-nickel stainless steels and irons on the other. An important consideration in connection with these steels is that their cost is low. It is equal to that of ordinary open hearth steel plus the actual cost of the chromium and copper contents. Physical properties of low-range chromium steels are given in the paper for five carbon ranges.

Mr. Palmer in his paper said that the ordinary stainless steel was very hard to machine. The problem of an easily machinable stainless steel was solved by the addition to the steel of 0.40 per cent of zirconium sulphide. Such steel can be cold drawn, whereas ordinary stainless steel cannot, because it adheres to the dies.

In the paper dealing with the use of stainless iron in the manufacture of nitric acid, it was said that this use of stainless iron, which began only four or five years ago, has expanded greatly in recent years, and that the du Pont Co. now has some 1500 tons of apparatus of this material in use.

Tool Steels Hold Interest at Metal Exposition

THE Tenth National Metal Exposition was one of the most successful ever held with over 80,000 sq. ft. of floor space being devoted to exhibits of metals and heat treating, processing and manufacturing equipment, a goodly portion of which was in operation.

While heat treating equipment was a very important part of the exhibit, the most interesting developments from the automotive viewpoint probably were those in

welding equipment and in high-speed cutting tools. A very large number of makers of tool steels had exhibits and nearly all of them reported progress in the development of tool steels of greater cutting capacity than ever before.

Possibly the most spectacular of these exhibits was that of the Carboloy Co., Inc., which showed the new cobalt-tungsten-carbide tool steel recently developed in the General Electric Co. laboratories in operation on some very unusual jobs.

Besides this product, however, there were innumerable other products on display which contribute considerably to the available cutting capacities of tool steels.

The Firth-Sterling Steel Co. displayed, among other exhibits, some of its recently developed Circle C steel with which it has been possible to machine manganese steels hitherto susceptible to grinding only.

Other new materials on display included a new free-cutting stainless steel recently developed by The Carpenter Steel Co. by the addition of a new ingredient, zirconium sulfid.

In the welding exhibits not so many new items of equipment were shown but the number of concerns exhibiting and the attention given the displays evidenced the increasing interest which this particular phase of metal working is receiving by all production men.

A feature of the Lincoln Electric Co. exhibit was one of its electric motors operating under water. Various types of spot welders were shown by the Federal Machine & Welder Co., Acme Electric Welder Co., and others, while displays of other kinds of welding machines and equipment were numerous.

Fusion Welding Corp. showed a recently developed arc welding machine available in various sizes and with either electric motor or gas engine power. Some rather interesting combination punch and shear machines built by the German Sonntag firm were exhibited by its agents, David H. Smith & Sons, Inc.

The Automatic Nut-Thread Corp. exhibited one of its nut threading machines by means of which it is said to be possible to obtain considerable speed in threading nuts while assuring the threads being square with the face of the nut.

A Berwick two-path electric heater for forging and unset work was exhibited by American Car & Foundry Co. This unit, which works on the same general principle as electric rivet heaters, is available for heating rods or bars from 9 in. up to 4 ft. in length. Experiments so far demonstrate that a ¾ in. diameter rod, 4 ft. long may be heated to 1800 deg. Fahr. in 80 sec. or at a rate of 45 to 50 pieces per hour. Power consumption in the tests made average from 15 to 18 kw. hr. per 100 lb. of metal heated.

S. L. Hoyt, General Electric Co., showing a specimen of Carboloy, which he discussed in a paper at an A.S.S.T. session

Wickwire Spencer Steel Co. demonstrated in a model heat-treating furnace the worth of a new product—a heat-resisting flexible wire conveyor belt—which is designed for use in the many conveyorized heat-treating operations which are being installed throughout the industry.

Globar Corp., a subsidiary of the Carborundum Co., showed electric furnaces equipped with its non-metallic heating elements, and C. I. Hayes also exhibited electric furnaces equipped with Globar heating elements which were suitable for heating purposes at temperatures up to 2700 deg. Fahr.

A new large size gas-fired rotary retort carburizing furnace with a capacity from 1000 to 1250 lb. per charge was shown by the American Gas Furnace Co.

Tinius Olsen Testing Machine Co., showed for the first time the Herbert type hardness testing machine and equipment for superhardening steel, as well as a new type of equipment for applying Brinell hardness tests. The Pittsburg Instrument & Machine Co. also displayed a new type of Brinell testing machine while the Thwing Instrument Co. exhibited a new type of recording pyrometer which can be used either as a thermo-electric pyrometer, an electrical resistance thermometer or a radiation pyrometer.

A new indicating controller with a visible scale the entire width of the instrument was a feature of the Leeds & Northrup Co. exhibit, while George Scherr displayed an assortment of Carl Zeiss optical dividing heads and measuring instruments of various kinds.

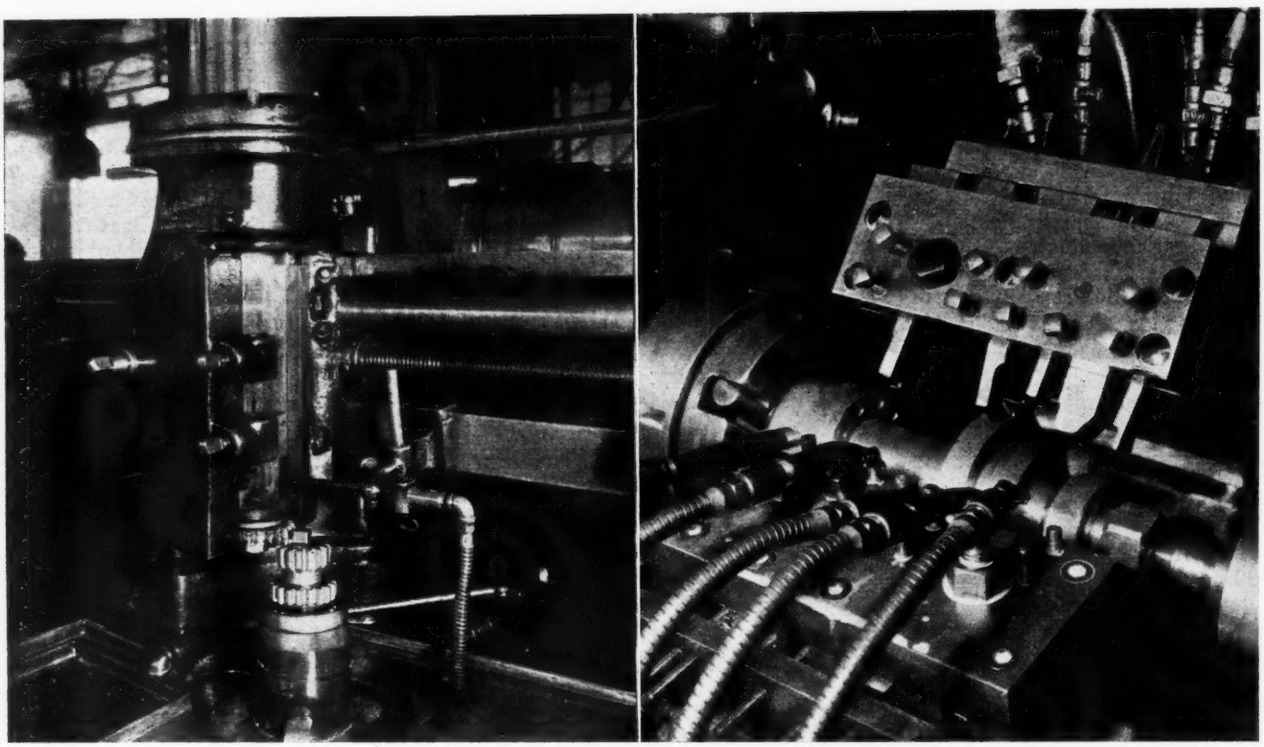
THAT the use of foreign automobiles by national and local authorities may be a useful stimulant for the national industry, helping to improve its own products and thereby assisting in developing its exports to non-producing countries, was one of the resolutions arrived at by the delegates at the Fifth World Motor Transport Congress, held in Rome from Sept. 25 to 29.

The congress was attended by 310 delegates from 40 nations, under the chairmanship of Senator Crespi.

The resolution that national authorities should not confine themselves to the use of home produced automobiles, but should encourage the purchase of foreign automobiles, ran counter to the nationalism which has been so strongly developed in practically all European countries.

The five main subjects discussed by the congress were "The Influence of Motor Transport Development Upon National Progress;" "The Use of Motor Vehicles by Government and Public Administration;" "Motor Vehicle Fuels and Their Economy;" "The Improving and Financing of Highways;" "Methods of Increasing Automobile Sales, and Improvements of Conditions of Purchase."

No decision was taken regarding the place of the next congress, but it is probable that it will be held in Paris in 1929. The American delegates were Alvan Macauley, president of the N.A.C.C.; George F. Bauer, foreign trade commissioner of the N.A.C.C.; H. M. Mitchell, American attache in Rome, and H. H. Kelly, Automotive Trade Commissioner to Europe. Other Americans attending the congress were Cortland Field Bishop, representing the A.A.A.; L. B. Benham, E. G. Willems, A. F. Waddell, all of the N.A.C.C., and O. H. Williams, of Hudson Motor Car Co.



Left—The internal teeth of Cadillac transmission gears are cut in a gear shaper. Right—Automatic lathes are employed to rough and finish turn complete transmission gears

Cadillac Transmission *Gears* Held *to Fine* Tolerances

0.0002 in. not uncommon in finished pieces. Methods used in production of intermediate speed gear described.

By K. W. Stillman

THE methods employed in the manufacture of few automotive parts have developed as rapidly during recent years as those of gear production. Accuracy in gears, particularly those employed in transmissions, which was unthought of but a few years ago, is now general practice in many motor vehicle plants.

Typical examples of the best current practice in gear production are to be found in the methods in use at the plant of the Cadillac Motor Car Co., where tolerances as small as 0.0002 in. are not at all uncommon in the finished pieces.

A description of the methods employed in producing a single gear—the intermediate speed gear—will illustrate, in general, the procedure followed in this plant for all transmission gears.

When the blank arrives in the gear department a spot is ground on it and a Brinell test is made. The first machine operation is then to drill the center hole in a single-spindle drill press.

The long hub is faced and bored in an automatic lathe and the bore chamfered, after which the hole is broached in a broaching machine and the gear is rough and finish turned complete in an automatic lathe. The hole and recess are then finished.

Both faces of the gear are ground while soft and this operation is followed by an inspection. A gear shaper then is employed to cut the internal teeth and the external teeth are cut in a hobbing machine. The ends of the internal teeth are rounded in a tooth rounding machine, after which two oil holes and four rivet holes are drilled and the gear is burred.

The gear is now heat-treated in an electric furnace which automatically indicates and records the exact temperature at which the part should be quenched. It is then tempered in an electric tempering furnace and an exacting hardness test is made and the gear thoroughly cleaned for the grinding operations.

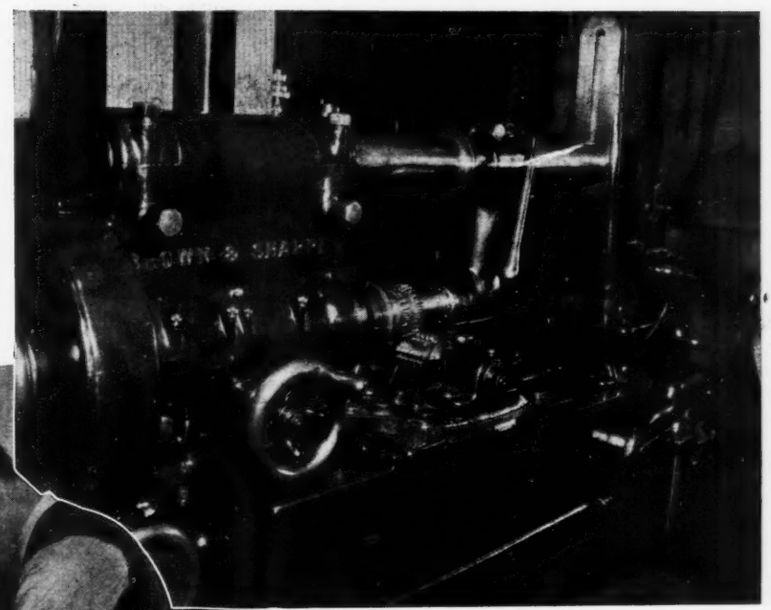
Four Grinding Operations

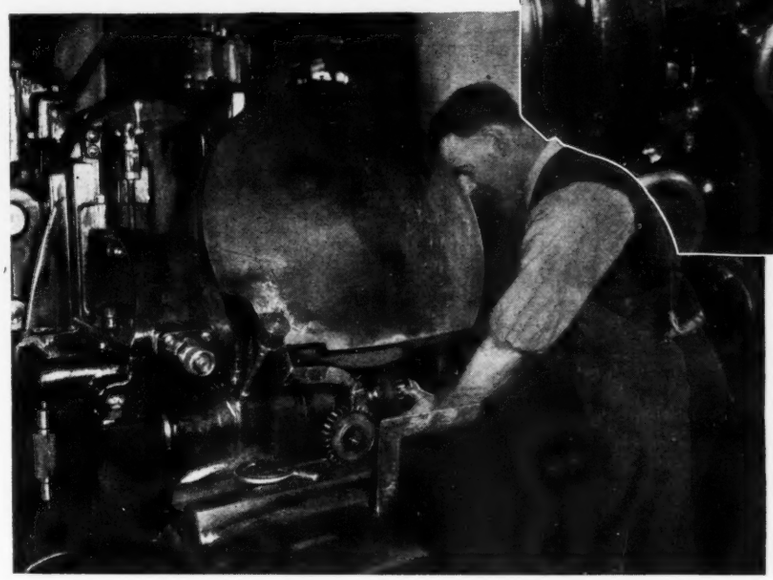
Four grinding operations follow, in which the hole and both faces of gear and outside diameter are ground, the internal teeth burnished and the gear inspected. Two grinders are then employed, the first to grind the drive side of the teeth and the second to grind the

coast side, and the gear passes to final inspection.

Tolerances permitted in this particular gear are identical with those allowed in the other gears of the Cadillac transmission. Tooth-to-tooth spacing distance must vary not more than 0.0002 in. and the same tolerance is permitted on the involute curve. Tooth thickness on individual gear teeth is permitted a tolerance of 0.0002 in. and a limit of 0.002 in. is allowed from gear to gear.

After assembly of the gears comes still more tests requiring very accurate machining to pass. The backlash between constant mesh gears may be not more than 0.002 to 0.004 in. and not more than 0.002 to 0.004 in. between the coupling and the speed gear.





Above—A gear hobbing machine is employed to cut the external teeth. Left—This gear-grinding machine of the generating type is employed on Cadillac transmission gears. The tolerances permitted in tooth spacing and contour are 0.0002 in.

In all machines employed for grinding gear teeth the work arbors and fixtures are kept accurate within tolerances of 0.0002 in.

Another rather complicated gear which may serve to still further illustrate the production methods employed at the Cadillac plant is the speed gear on the jackshaft.

The first operation on this piece is to mill the ends in a duplex milling machine and then to drill and ream the jackshaft hole and rough turn the flange. This work is done on an automatic turret lathe. Ten holes in the flange are drilled in a drill press and, as in the intermediate speed gear, an automatic lathe is employed to turn the body of the gear complete.

An oil hole is drilled, after which the shaft hole is broached in a broaching machine. Two more automatic lathes are used next, one for facing the sides of the gears and flange and for semi-finish turning the outside diameters, and the other for finish turning the outside diameters and facing the ends to length.

The 10 flange holes are chamfered and burred and both ends are chamfered, after which the center hole is hand-reamed and the gear is inspected.

A surface grinder is then employed to grind both ends, after which a relief in the center hole is formed in a lathe. One side of the intermediate gear is then ground for locating purposes, followed by another inspection.

The reverse gear teeth are cut in a gear shaper, this operation being followed, in another similar machine, by the rough cutting of the low speed gear teeth. The intermediate gear teeth are then hobbed and two more gear shapers are employed to finish cut the teeth in both gears. Another inspection follows these operations.

Teeth of both gears are rounded in two operations in tooth rounding machines, after which they are burred. Special gear burnishing machines are used next to burnish the reverse and intermediate gears in two operations, which are followed by still another inspection.

The gears are then heat-treated in an electric furnace and after passing inspection are wire brushed and the center hole is lapped in a speed lathe. The hole is ground in an internal grinder and in two more grinding machines the outside diameters of the teeth and the flange face and diameter of the hub are ground.

The ends are ground to size in a surface grinder followed by two consecutive inspections, one for the gear teeth and the other for the length of the gear.

Final operations are performed on two gear grinders, one grinding the driving side of the low speed gear and the other the back side. Final inspection follows.

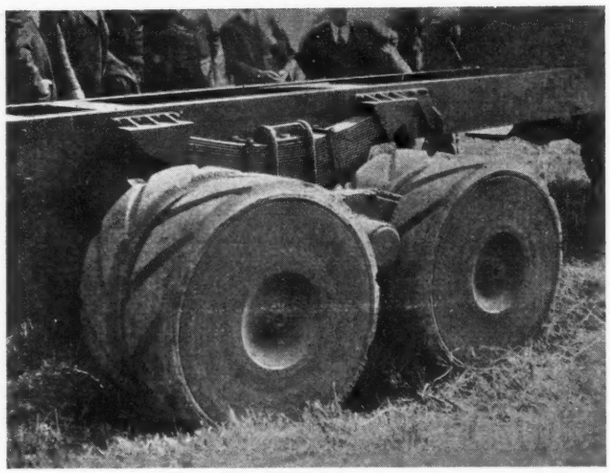
THE French Minister of Agriculture in a letter recently addressed to a member of the French House of Representatives stated that a decree passed on Dec. 21, 1926, exempts the greater part of all agricultural tractors from taxation of all kinds. All agricultural tractors, motor cultivators and stationary engines utilized for the operation of agricultural implements, for the exclusive cultivation of the fields, and not utilized for road transport in any way, are entirely tax-free.

New *Eight-Wheel* Drive Truck Shown at Aberdeen *Demonstration*

Four pairs of driving wheels in rear drive assembly. Army Ordnance Association stages tests of latest mobile equipment for artillery at proving ground.

THE tenth annual meeting of the Army Ordnance Association at Aberdeen Proving Ground on Oct. 4, to which members of the various technical societies were invited, was productive of a most interesting demonstration of the new mobile equipment for field artillery.

In this demonstration, trucks on which small tractors and guns were loaded were run onto the field and the entire operation of dismounting the guns, towing them into position with the tractors, firing a number of rounds and then reloading the equipment and driving from the field was performed. Portable skids or ramps were used to run the units on and off the trucks, and a special low vehicle equipped with wheels and rubber tires was used as a mount for the creeper tractor.



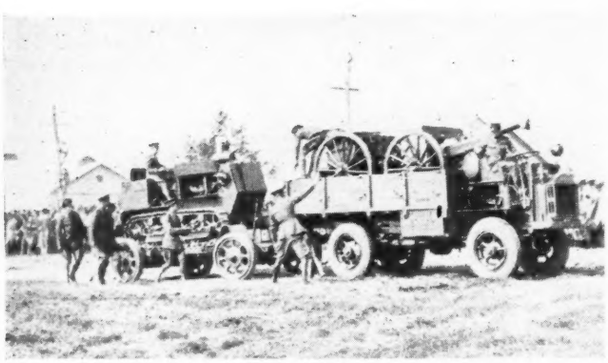
Four-wheel drive assembly of the eight-wheel drive truck. Note portion of drive casing between wheels

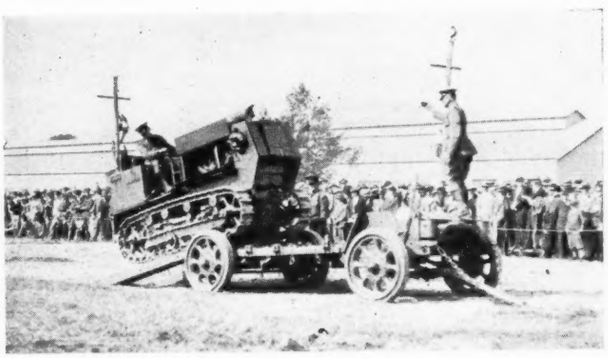
Opportunity was afforded to compare this method of transporting field equipment with the older and more familiar method of horse-drawn artillery. While the advantages of motorized equipment, particularly in moving long distances and in greater freedom from possible disability under fire cannot be doubted, in so far as time required to get into position, fire and return to cover is concerned, the horse-drawn equipment still has a safe margin of time in its favor.

Through better arrangements for meals, more closely regulated means of handling the spectators and a very carefully scheduled and announced program, the day was not only an improvement over former years, but undoubtedly served to make everyone feel at ease in spite of the noise and turmoil.

Of particular interest to the automotive men present was a new eight-wheel drive truck which was exhibited during the day. It embodies a rear drive assembly of four pairs of driving wheels. There are two front wheels which are not driven.

Power from the engine is transmitted through a propeller shaft and a rear axle unit. At the outer ends of the axle there is a casing extending forward and to the rear an equal distance. At each end of the casing there is a short cross shaft and a wheel is attached to each end of each shaft. Inside the casing there is a train of spur gears which transmits power from the axle shaft to the pair of short shafts on which the wheels are mounted. As shown in the illustration, this casing is between the wheels. The casing is free to turn about the axle housing to permit movement of the wheels in pairs when going over obstructions or depressions in the road. The mounting of the wheels gives the impression of a giant roller skate on each side of the vehicle.





A motorized battery of artillery moving into position. The gun and caisson are carried in the body of a F.W.D. truck which tows a trailer carrying a tractor. The tractor unloads the gun and pulls it across country to scene of action

Mounting of the front axle is unusual and like the rear assembly it is designed to traverse bad going. This mounting may be likened to the platform rear spring construction used on passenger cars a few years ago, the principal difference being that a cross bar pivoted at the center is used in place of a cross spring. There are two semi-elliptic springs shackled at the front to this cross bar. The bar is fastened to a triangular cross-member at the front of the frame by means of a clevis and pin.

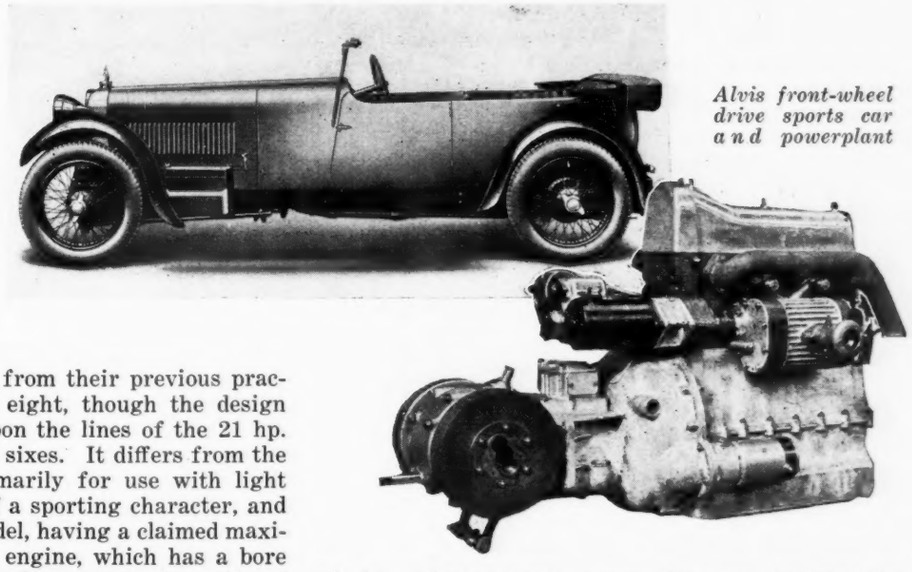
The truck was built in the shop of Walter Christie, according to a representative at the Proving Ground, and has been offered for test by the Ordnance Department.

British Automobile Show

(Continued from page 543)

tics, those at the rear being underslung. In addition to the open five-passenger model at £250 a fabric sedan body is offered seating four adults and upholstered in leather at £275. A fuel consumption of over 30 m.p.g. is claimed.

The new so-called "self-changing" gearbox, offered at £35 and £50 extra, respectively, with the 20 hp. and 30 hp. six-cylinder Armstrong Siddeleys, is of the planetary type with the gear ratios selected by a short lever over the steering wheels and brought into use by depressing what represents the clutch pedal. The control lever enables the driver to select his next gear before he actually requires it, and the rapidity with which the actual changes can be made is said to afford remarkable acceleration when the gears are used in succession. This new gearbox, which is based on the Wilson patents, thereby resembling a gearset tested some two years ago by Vauxhall Motors, is notable in being silent on all ratios.



Alvis front-wheel drive sports car and powerplant

Lanchesters have departed from their previous practice in producing a straight eight, though the design throughout follows closely upon the lines of the 21 hp. and 40 hp. overhead camshaft sixes. It differs from the latter in being intended primarily for use with light bodywork, open and closed, of a sporting character, and is essentially a high-speed model, having a claimed maximum of over 80 m.p.h. The engine, which has a bore and stroke of 3.1 by 4.5 in. and a compression ratio of 4.8 to 1, is of approximately 4½ liters capacity and develops 82 b.hp. at 2800 r.p.m. The cylinder block is mounted on a crankcase of aluminum, the balanced crankshaft being mounted on 10 bearings, the ninth at the rear end of the engine being divided into two portions with the skew gear between them for driving the vertical shaft for the overhead camshaft. This vertical shaft is continued downward to drive the gear oil pump and also drives a cross-shaft driving the dynamo and, through chain transmission, the magneto; at the other end of the transverse shaft is the water pump. The cylinder head has a "penthouse" top in which the overhead valves are set at an angle to one another. Dual ignition is provided, the coil distributor extending upward from the overhead valve cover. There are two spark plugs in each cylinder at opposite sides. Oil circulation is by pressure throughout, with the main filter supplemented by a Purolator oil cleaner.

Engine and four-speed gearset with single plate clutch are mounted as a unit, the gear ratios being: Top direct 3.7 to 1; third 6.25; second 8.7 and first 15.2. Behind the gearset the transmission follows Lanchester practice, *i.e.*, inclosed propeller shaft and worm final drive. Cantilever and half-elliptic front springs are fitted, the spring ends being anchored in roller bearings instead of being shackled. The wheelbase is 142 in. and the track 56 in., with a ground clearance of 9½ in. on either disk or wire wheels with 32 by 6 in. Dunlop tires. The chassis is sold either with or without bodywork, its price being £1,325, but a standardized four-door fabric sedan body is offered at £450, the body in this case, as in others, being mounted on the chassis through the agency of four rubber blocks.

The new six-cylinder Standard follows closely upon the lines of the four-cylinder 9 hp. model, which, introduced at last year's show, attained considerable popularity. In its bore and stroke of 63.5 by 102 mm. the resemblance is continued, these dimensions giving the engine a capacity of just below two liters. Side valves are used, the inlets being slightly larger than the exhausts; the crankshaft is carried in seven bearings in the unit cylinder block and crankcase casting, which is continued well below the center line of the crankshaft. Distribution is by roller chain, the latter serving the four-bearing camshaft and the generator. Ignition is by coil, the distributor being driven from the rear end of the generator shaft; spark plugs are set at the top of the cylinder head, where they are inclosed by a pressed steel cover plate which gives the engine the appearance of being an overhead valve type. Water circulation is by a belt-driven pump on the end of the fan-shaft; lubrication is by pressure throughout.

The single-plate clutch and four-speed gearset are mounted as a unit with the engine, the unit having a four-point suspension; the rear mounting consists of a flanged pressing secured between the rear end of the crankcase and the clutch housing, side extensions resting on semi-flexible brackets attached to the frame rails. The front points are set close together and rest upon the flanged rear extension of the inverted U-shaped front cross-member, this extension giving a certain degree of flexibility. The gear ratios are 5.25 to 1; 8.35; 11.68 and 20 to 1.

Gear Blanks Assembled by Arc Welding are Advocated

Would be built up of forgings and pressings, says speaker at A. G. M. A. meeting. Recent developments point to wider use of lapping in gear manufacture.

By P. M. Heldt

NEW methods in industry was the keynote of the papers presented at the fall meeting of the American Gear Manufacturers' Association, held at Hotel Statler, Buffalo, Oct. 11-13.

One of the speakers advocated the building up of machinery frames from rolled sheet sections, and of gear blanks from forgings and pressings, the parts in both cases being assembled by arc welding. Another described a new method of finishing gear teeth by a shaving process, in which a cutter of the full width of the tooth is moved in a straight line, and the gear blank is simultaneously rocked around its axis, which compound motion results in the generation of a true involute curve.

Nitriding Hardening Process

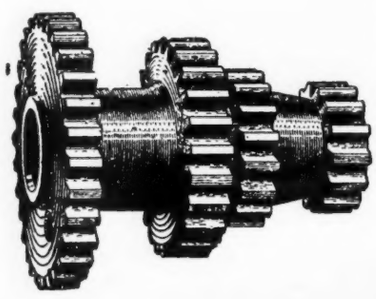
A third speaker dealt with the subject of hardening steel parts by the nitriding process, in connection with which experimental work has been carried on at several engineering research institutions during the past year.

While the finishing of gears by the lapping process is not entirely new, the process has not been widely used so far, except for salvaging purposes. But the announcement of a new lapping process some months ago and an address on "Manufactured Abrasives in Gear Lapping" at this meeting seem to point to a growing importance of this method of gear finishing.

Finally, a new testing machine was described which records errors in the tooth contour of gears and eccentricity on a scale of ⅜ in. per 0.001 in.

The meeting opened with a business session, and reports from various sub-committees of the Standards Committee were received, but no new standards or recommended practices were accepted.

J. F. Lincoln, vice-president and general manager of the Lincoln Electric Co., of Cleveland, gave a talk on "The Effects of Arc Welding on Manufacturing." He gave it as his opinion—based upon the experience of his own company in replacing castings by drawn steel shapes welded up—that within the next 10 years at least 85 per cent of the parts now made of castings will be made of welded steel. "What a profound effect this will have on industry can well be imagined," said Mr. Lincoln. "Inventories of castings will be replaced with inventories of structural steel requiring about one-fourth the space and representing one-tenth the investment.



"Pattern storage and pattern development, which heretofore have been tremendous items in manufacturing costs, will be eliminated. Breakage and scrap, which heretofore have been an appreciable item, will be entirely eliminated because any part which is wrongly machined will be welded up and remachined. Steel does not break in handling as does cast iron, hence another great waste will be eliminated.

"Change of design, which heretofore has been a tremendously difficult process, will be greatly simplified, and instead of the same model being manufactured without change over a long period of time, changes will take place continuously, because of the ease of making them and the entire elimination of pattern equipment."

"Delivery of special machinery will be tremendously shortened and the weight of all machinery will be greatly decreased. This will be an evolution—not a revolution—and it does not mean that present organizations must be replaced with new ones but that designers and officials must become welding-minded so that they will see a structure not as an accumulation of castings and rivets, but as as structure built up of joined pieces of steel, making a much better structure at a much lower cost."

Many Objections Seen

The audience was not quite so enthusiastic about the future of welding, more particularly in the machine tool industry, as the speaker, and E. W. Miller, chief engineer of the Fellows Gear Shaper Co., asked Mr. Lincoln how he would overcome the following objections: Buyers of machine tools expect attractive forms, including smooth surfaces and nicely rounded corners; they want such forms not only because they are more attractive to the eye but because, if there are sharp corners as on structural shapes, the workmen will easily bruise their hands and bark their shins, and with the present use of cutting compounds, they may very easily contract oil infection. Another speaker said that while there was not much danger of the workmen cutting themselves on the rolled edges of the steel members, they would cut themselves on the sharp sawed-off edges.

Mr. Miller further mentioned that in modern precision machine tools great rigidity is required, and this calls for a certain mass of material in the structure.

Mr. Lincoln's reply to the objection on the ground of appearance was that conceptions of beauty are changing constantly, and referred by way of illustration to women's fashions of the gay nineties which at that period were regarded as highly esthetic. The objection that the steel shapes would injure workmen's hands he met by the statement that workmen today handle a far greater tonnage of structural steel than of iron castings.

AMONG the papers read at the meeting of the American Gear Manufacturers Association, which Mr. Heldt reports in the accompanying article, were two dealing with new tool developments.

One of these developments is a machine for shaping gears by a shaving process. Several of the machines are now in operation in the New Castle, Ind., plant of the Chrysler Corp.

The other is a new measuring machine designed for measuring tooth spacing or for comparing the circular pitch of individual teeth.

In general the audience was quite sympathetic to the proposition presented by Mr. Lincoln, but it seemed that they did not expect quite as rapid an evolution as he foresaw. The speaker's views evidently were shared, however, by a representative of the General Electric Co., who gave it as his opinion that in 10 years that company would not operate foundries any more.

Ira Short, marine engineer of the Westinghouse Electric & Mfg. Co.'s South Philadelphia Works, presented an excellent paper on "High Speed Gearing." The gearing referred to being that used for transmitting the power of marine steam turbines to propeller shafts.

Paper on Abrasives

A paper on "Manufactured Abrasives in Gear Lapping" was read by H. J. Willis, research engineer of the Carborundum Co. Mr. Willis pointed out that no one abrasive is suitable for more than a few types of gears, and the lapping media should be carefully selected in every case. Hardened gears having a sliding action require a hard, sharp grain, while such a medium used on soft gears having a rolling action would prove disastrous. Gears having both rolling and sliding action (by which the author probably means helical spur and helical bevel gears) require a grain different from both.

Crystalline alumina in some grades is suitable for soft gears with a sliding action, but is too soft for hard gears. Carbide of silicon (carborundum) is suited for hard gears of all classes but is too sharp for soft gears. The black grade is the best for gear work.

If gears are to be lapped in pairs or trains, the abrasive must be selected to suit the softest gear of the train. Mr. Willis said he favored carbide of silicon for hardened spiral bevels, hypoids, spurs, helicals and worms. For soft spur, helical and worm gears he preferred a soft and well-rounded form of crystalline alumina. Being soft, it will not impregnate the gear, yet it is tough enough to cut rapidly.

Long experience in the lapping of gears, particularly spiral bevels, has shown that a closely graded grain that will cut fast enough for commercial lapping is too harsh and will leave deep grain marks. Packing with a well-selected grit is required to combine a good finish with speed. This has led the Carborundum Company to place on the market a carbide of silicon grain known as BAA, for use on spiral bevel and hypoid gears. It is adapted particularly for use in cases where considerable metal must be removed.

The usual practice in lapping is to make up a batch of grain and oil and use it until it is either exhausted or the grain is broken down. This results in variation of the lapping action with the breaking down of the grain. To offset this the BAA grain is so graded that by keeping the lapping medium constantly freshened by the daily addition of fresh grain and oil, this variable is eliminated. Usually the lapping material carried off by the lapped gears is replaced daily.

The success of lapping depends to a considerable extent on the vehicle carrying the grain. This vehicle should be unaffected by ordinary temperature changes; it should remain uniformly mixed with the grain; the grain must be held uniformly in suspension; the mixture must be homogeneous, that is, the grain must be uniformly separated in all directions; it must cut rapidly with shallow grain marks, must generate only a negligible amount of heat, must be noncorrosive, must not injure the operator's skin, and must not require volatile fluids for cleaning.

Grain must not be present in the vehicle much in excess of 25 per cent, in order to permit of the free and individual abrasive action of each grain, and to allow space for the removed metal, but grain in this proportion will not be stable, as it will easily form in pockets.

The Carborundum Co. is now marketing a finishing compound which is said to be free from the various variables that usually cause trouble in lapping. A special finishing compound is offered for each of 10 lapping operations, with several grades of fineness for each. As a result of developing these special compounds and the technique of the process, the time of finishing straight worms has been cut 62 per cent, and that of soft spur and helical timing gears, 68 per cent.

No matter what abrasive is used in lapping, it should always be cleaned off thoroughly. Kerosene and hot water are recommended, together with the use of a brush.

Gear Shaving Process

H. D. Tanner, manager of the Gear Division of the Pratt & Whitney Co., gave a paper on the gear shaving process which is being introduced by this company. The machine employed was invented by James B. Barnes of Dayton, O., and has been developed by the Pratt & Whitney Co. with the cooperation of the Chrysler Corp., which latter has a battery of these machines installed in its New Castle, Ind., plant. Gears to be finished by the shaving process are first roughed out by hobbing, the hob used having teeth of peculiar form. It leaves the tooth with a certain amount of excess thickness over the major part of its depth, but from a short distance above the base circle down it cuts below the true involute form, from 0.004 to 0.006 in. below at the base circle, to enable the shaving tool to "rim out" without leaving a shoulder. Gears are roughed to the full Fellows depth.

The cutting edge of the shaving tool, instead of being straight, is made slightly concave, so as to give a slightly convex tooth face, to allow for possible misalignment of shafts. Form cuts are taken on each tooth face by the cutters, the depth of the first cut depending upon

the amount of stock left by the hob, that of the second cut being 0.002 in. and that of the third and fourth, 0.001 in. each. The machine has a regular cycle including all four cuts and it stops automatically at the end of the cycle. It completes 45 cycles per minute.

Russell M. Coldwell in a paper on "Predetermining Quality Gearing" described a new measuring machine developed by the Fellows Gear Shaper Co., with which Mr. Coldwell is connected. A sample machine was exhibited and demonstrated at the meeting. The machine is designed for measuring tooth spacing or for comparing the circular pitches of individual teeth. The principle of the machine is very simple. It does not measure the actual circular pitch but the linear distance between corresponding points on adjacent teeth, the points being located close to the pitch circle. One tooth is brought up against a stop on the machine and a contact lever bears against the adjacent tooth. A plate spring assures a positive location of the tooth. A modification of the machine as used for comparing tooth spacings serves to determine tooth eccentricity with respect to the bore. While it is difficult to separately determine errors of tooth spacing and of eccentricity by a single measurement, a general interpretation of the whole cycle of measurement will often accomplish this result.

On Friday those attending the meeting were the guests of the Covert Gear & Mfg. Corp., Lockport, N. Y., at luncheon, and during the afternoon some went on a visit to the Farrell Foundry & Machine Company's plant, where the Sykes herringbone gear generator is being manufactured, while others visited the plant of the Lumen Bearing Co., where chilled bronze castings of different compositions are made for worm gears.

E. J. Frost, who recently sold his interest in the Frost Gear & Machine Co., Jackson, Mich., and in consequence was forced to resign as a member of the A. G. M. A. executive committee, was elected to honorary membership in the association. Mr. Frost served as president of the association for three years prior to 1928.

The next meeting of the A. G. M. A. will be held at Cleveland during the spring of 1929.

Chromium-Plated Cores

IN making die castings of copper-rich alloys, use is made of steel cores. Deterioration of these cores is rather rapid, being due partly to erosion, partly to the welding on of the cast metal, and partly to tensile stresses set up in liberating the hot core after each casting. Some heat-resisting steel is generally used for the cores as well as for the mold inlays, and it has been found that so-called high speed steels and stainless steels are much more satisfactory than plain carbon steels. The life of the cores with copper-rich alloys is only one-fourth or one-fifth as great as when the casting material is an aluminum alloy or the ordinary low-melting point alloys used for die castings.

Some tests have been made at the Research Department, Woolwich, England, on the use of chromium-plated cores, and the results are discussed in a recent Institute of Metals paper by Genders, Reader and Foster. Eight bars of Armco iron having electro-deposited coatings of chromium varying in thickness in steps of 0.001 in. from 0.001 in. to 0.008 in. were used. These were immersed in aluminum bronze (90 per cent copper, 10 per cent aluminum) at 1100 deg. C. for three hours, the molten alloy being in continuous motion throughout the test. An unplated bar of Armco iron was included for comparison.

On removal of the specimens from the bath it was found that the unplated Armco iron had completely dissolved. The plated bars were practically unattacked, except for having a coating 0.007 in. thick, which showed local attack at one point where the chromium appeared to have broken. The results of the tests indicated that a very thin deposit of chromium, if continuous and adherent, is efficient in providing protection against molten aluminum bronze.

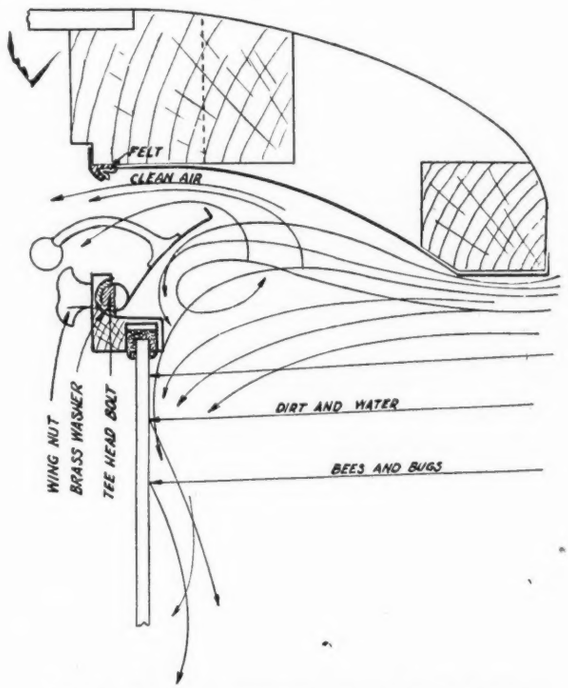
Work tests on chromium plated cores and molds have indicated that although the coating effects complete protection, the unequal heating to which it is subjected leads to its removal by flaking. The full practical utility of this method will thus depend on the further improvement in the adhesion of electro-deposited castings.

Tests were made also on calorized or aluminized test bars of Armco iron. The calorizing treatment consists in heating iron or steel in contact with materials containing aluminum in an inert atmosphere. A skin of alloy which has a high resistance to oxidation in air at high temperatures is formed on the treated article. The treatment greatly increases the life of apparatus used in heat-treating operations, such as annealing boxes.

Car Ventilating System

THE Heine-Velox Engineering Co., 949 Market St., San Francisco, has recently developed a new type of ventilating system for motor vehicles. The accompanying diagram shows how the device is installed and how the air current which enters the car through the ventilator is kept free from dust, rain and other objectionable matter.

As indicated, the ventilator is readily adjustable from a wide open position to complete closure and the particular arrangement is said to prevent warm air from the hood from entering the car and to admit only fresh air from well above the hood.



Sketch showing operating principle of Heine-Velox car ventilating system

Just Among Ourselves

Maybe You Too Have a Little Superstition

SUPERSTITIONS of base ball players, boxers and actors are numerous and proverbial, but apparently some automotive salesmen are not without at least a mite of confidence in the potency of charms, amulets and mystic motions. Heard the other day about a salesman for a big steel company which does quite a bit of automotive business who had been trying to get an important account for a number of years. He never succeeded until one day, by mistake, he happened to call on this organization with one of his socks failing to mate with the other. Since that time he always makes certain that his socks are not mates while contacting this particular account. He still has the business. Q.E.D. — Maybe salesmen around our industry have more superstitions than we have heard about; glad to hear about any that come to anybody's mind—no names published.

* * *

Marketing Efficiency is Chief Aim Now

A PROMINENT car company president who came up through the production side of the business was asked the other day where he thought future production economies were coming from. He said he couldn't get as interested in the subject as one might suppose he should be. Says what he wants is somebody who will show him how to get into his marketing and merchandising operations about half the efficiency that already existed in his production department. Added that, of course, he wouldn't hesitate to scrap a $10,000 machine if it would save a few minutes on some operation and that this same point of view is held by every other progressive manufacturing executive in the industry that he knows about. We agree with him. It often seems that this "of course" attitude about scrapping the old for the better new is one of the chief things that has made continued increases in production efficiency possible. How much of that same "of course" attitude generally permeates our automotive marketing thought; isn't there far more tendency in the marketing end to hang on to methods and plans rooted in tradition; isn't this difference in general psychology approach responsible to some reasonable degree at least for the difference in results from an efficiency standpoint between the production and the marketing divisions of the industry?

* * *

We Knew There Was a Catch in This Carload

LABORATORY tests made in connection with the preparation of a thesis at Reed College, Portland, Ore., to determine whether blindfolded smokers could recognize their favorite brand among others on the market indicated that they couldn't. Summaries of the tests printed in the *New Republic* stated among other things that the experiments indicated that "The subjects consistently did less well than they would have done on a probability (guesswork) basis, indicating dependence on extraneous cues furnished by the experimenter's technique rather than use of *objective* ones furnished by the tobacco itself." Commenting on the tests the *New Republic* adds a statement which might apply almost equally well to automobiles in these days when there aren't any really poor cars mechanically on the market: "Increasingly," it says, "we buy with our eyes, and those that can assault the vision most arrestingly get the order." That statement, to our mind, isn't quite true, however, as the problem is much more complex than that of merely "arresting" attention. It isn't sufficient to stop the eyes of the customer; his eyes must be attracted, pleased, delighted—not merely arrested. Bizarre colorings will arrest the customer's eye; lastingly harmonious and satisfying combinations are necessary to make him desire the car. These latter are not easy to predetermine.

* * *

Needed—An Instrument for Matching Colors

AS yet no practical instrument has been reported that can compete with the trained eye of the skilled dyer in detecting minute variations from close color matches," says a recent issue of the Industrial Bulletin of Arthur D. Little, Inc. The statement is significant as indicating just one other of the numerous lines of development still left for instrumentation likely to be of value in automotive and allied work. A photoelectric apparatus developed by Western Electric Co. and described a year or so ago at an S.A.E. meeting seemed to have some possibilities along this particular line, although its chief purpose was a bit different in character. Whether that particular device has been tried out successfully in connection with color matching we haven't heard, but there would seem to be a good field for such an instrument in several phases of automotive body work.

—N. G. S.

First *Willys-Knight* Bus Designed for Foreign Markets

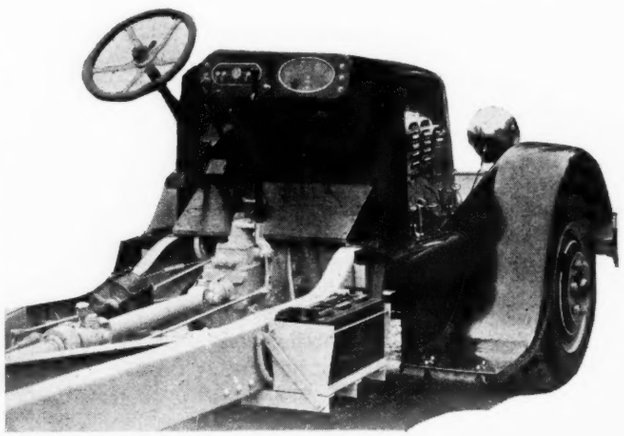
17-passenger, six-cylinder parlor coach, with road speed of 45 m.p.h., has wheelbase of 190 in. and overall length of 276½ in. Four-wheel brakes fitted with booster.

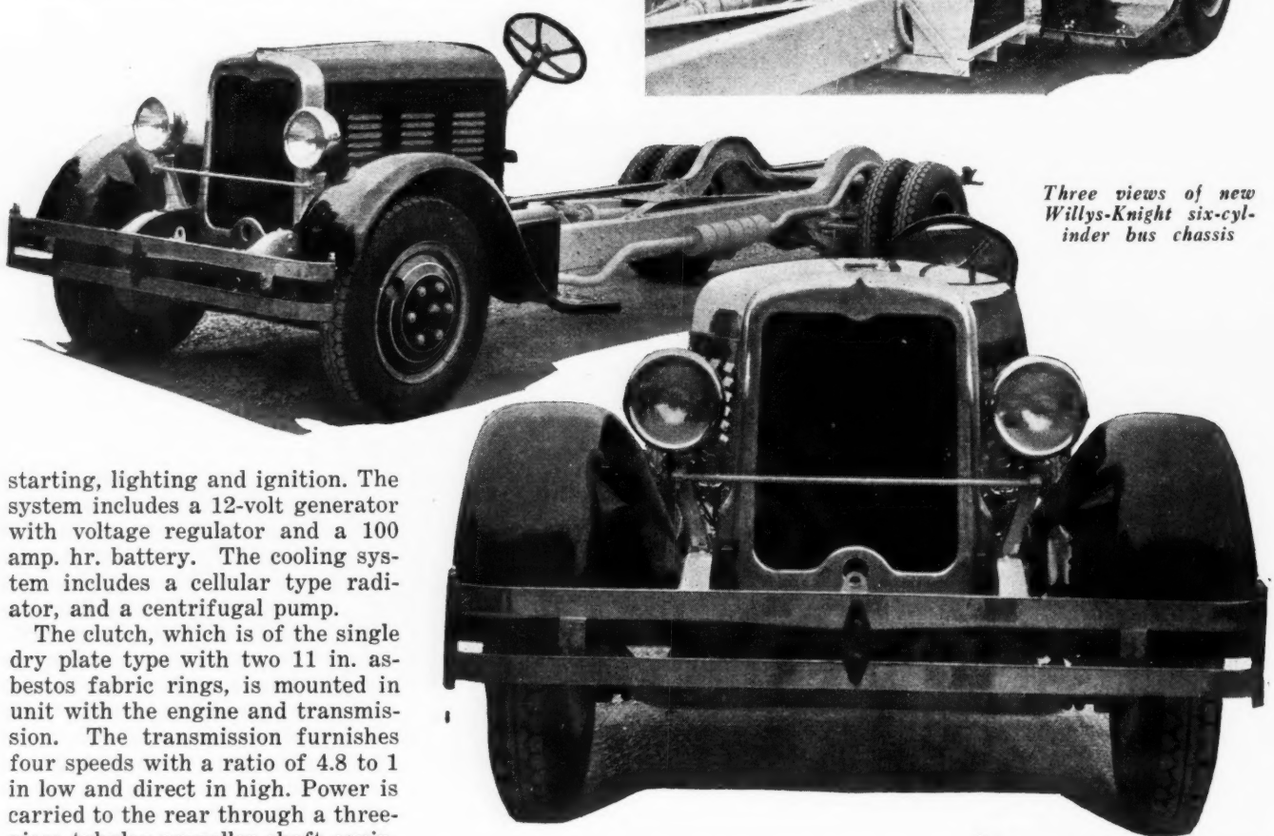
As announced in *Automotive Industries* of Oct. 6, Willys-Knight has entered the bus field with a 17-passenger, six-cylinder parlor coach which is to be marketed at present in foreign fields only, through the Willys-Knight Export Corp.

The new unit is powered by a Knight sleeve-valve, 3⅜ x 4¾ in. engine, developing 70 hp. at 2600 r.p.m. and providing a road speed of 45 m.p.h. The crankshaft is carried in seven bearings.

Gasoline is fed by vacuum from a 45-gal. tank to a Tillotson carburetor. The tank is cradle mounted at the rear of the frame and is furnished with a special flexible filler pipe with castings for mounting on outside of body. A gasoline gage is mounted on the dash. The exhaust pipe is mounted on the outside of the frame.

Leech-Neville electrical equipment is employed for starting, lighting and ignition. The system includes a 12-volt generator with voltage regulator and a 100 amp. hr. battery. The cooling system includes a cellular type radiator, and a centrifugal pump.





Three views of new Willys-Knight six-cylinder bus chassis

The clutch, which is of the single dry plate type with two 11 in. asbestos fabric rings, is mounted in unit with the engine and transmission. The transmission furnishes four speeds with a ratio of 4.8 to 1 in low and direct in high. Power is carried to the rear through a three-piece tubular propeller shaft equipped with four metal universal joints. Double row self-aligning bearings support the shaft at two points in the center. The rear axle is of the double reduction, full floating type providing a standard with auxiliaries final reduction of 6 to 1. Various other axle ratios are obtainable.

The frame is of pressed steel, 8⅝ in. depth, 3¼ in. flange and 3/16 in. stock with kick-ups for front and rear axles. It is reinforced by an X-brace in the center and seven channel and one tubular cross-members as well as frame liners. Semi-elliptic springs

which function under the load, support the frame. They measure 46 x 2½ in. in front and 60 x 3 in., rear. Houdaille shock absorbers are supplied at extra cost.

Four-wheel brakes, operated in conjunction with booster mechanism and a hand brake actuating on the rear wheels make up the braking system. Steering is through the cam and lever gear. Budd-Michelin disk wheels equipped with 32 x 6.75 balloon single and dual rears are standard. Dimensions: Wheelbase, 190 in.; overall length, 276½ in.; back of dash to center of rear axle, 151 7/16 in.; back of dash to end of frame, 208⅜ in.; weight, 4800 lb.; body allowance, 3000 lb.; maximum capacity (body and load), 7000 lb., frame height from ground at front door loaded, 21 in.

Standard equipment includes speedometer, front spring bumper, heat indicator, gasoline gage, etc.

Five Maybach Engines Used on Graf Zeppelin

THE Graf Zeppelin, which completed its trip from Germany to Lakehurst, N. J., on Oct. 15, is powered by five 12-cylinder, 550-hp. Maybach-Zeppelin VL-2 engines which are housed in individual power cars slung beneath the hull in such a way that the propellers escape one another's backwash. These engines weigh 2450 lb. each, and the aggregate of 2750 lb. gives the ship a cruising speed of about 72 m.p.h. in still air, a top speed of about 80 m.p.h., and a cruising radius of about 6100 miles.

The VL-2 is a development of the Maybach-Zeppelin engines in the U. S. Navy's Los Angeles, built in Germany in 1924. That type produced 420 hp. at sea level and 400 at the altitude of Friedrichshafen, at 1400 r.p.m. Owing to increased compression, the use of aluminum pistons and carburetor alterations, the VL-2 develops 600 hp. at sea level and 550 at Friedrichshafen, at 1600 r.p.m.

While lightness is the first consideration in an airplane engine, fuel economy and reliability are more important in an airship engine, because on long cruises, such as the Friedrichshafen-New York flight, an airship engine may run as long as 100 hours without stopping. If it is more efficient, the reduction in the amount of fuel that has to be carried will more than offset its greater weight.

Whereas most airplane engines require an overhauling atfer 300 hours' flying, tests made on the VL-2 at Friedrichshafen indicate that it will need minor adjustments only once every 1000 hours and a major overhauling every 2000 hours. This longer life is said to be largely attributable to the use of roller bearings. With the exception of the piston pin bushings, all shaft bearings are of the roller type.

Another important quality of an airship engine is direct reversibility. An airship is handled much like a steamship. Its engines must at times go astern so that the ship may moor or land, as a steamer docks. In previous designs this was accomplished by reversing gears between engine and propeller. These are objectionable, however, because they add to the weight, require longer and heavier power cars, and are the cause of frequent trouble. The VL-2 engine is capable of running in either direction. Shifting the camshaft changes the timing of the 36 overhead valves, and this constitutes the reversing operation. A compressed air starter cranks the engine in either direction.

Perhaps the most significant advance in the Graf Zeppelin over previous lighter-than-air craft lies in the interchangebale use of liquid and gaseous fuel (gasoline and Blau gas). The use of gaseous fuel in an airship offers great advantages. Carrying gaseous fuel is solely a question of space, weight being a negligible factor; and inasmuch as the head resistance of stream-lined airships does not increase in direct proportion to size, an appreciable increase in the cruising radius has been brought about. Furthermore, if the ship had to carry large quantities of liquid fuel, its structure would have to be considerably stronger and heavier.

Ordinarily an airship carries a great deal of water ballast, which can be dropped if buoyancy is lost during flight. The Graf Zeppelin carries a quantity of gasoline (8 tons) instead. As soon as it becomes necessary to lighten the ship, the engines are switched to burn gasoline.

Blau gas is an industrial gas which has been used in Germany for railway coach lighting, for harbor buoys, etc. Gas oil (a petroleum fraction) is used as a base in the manufacture of this gas. The oil is subjected to moderately high temperatures in retorts and is thus cracked, and the gas produced is then scrubbed and washed, that is, freed of its tarry material and entrained carbon particles. The gas is then cooled, and when it is to be used for industrial purposes it is compressed to the liquid state and placed in steel bottles. It contains a large proportion of unsaturated hydrocarbons, which makes it particularly suitable for use in internal combustion engines, as these have pronounced anti-detonating properties and permit of the use of high compression. The specific gravity of Blau gas varies between 1.04 and 1.08. Being slightly heavier than air, the gas flows to the mixers by gravity. A slightly greater weight than air is an advantage also in that the loss in weight with consumption of the gaseous fuel tends to compensate for the loss of buoyancy due to leakage of hydrogen (or helium).

The VL-2 was adapted to gaseous fuel by making the throttle valve shafts of the Maybach carburetors hollow. There are four of these carburetors per engine, one to each three cylinders. From the bags containing the Blau gas, pipes lead into the valve shafts. An adjustment valve controls the flow of gas according to the throttle position. Another valve, inserted into the gas feed lines, permits a change from gaseous to liquid fuel or vice versa in a few seconds without stopping the engine.

The specific consumption of liquid fuel at full load is said to average 0.451 lb. per hp.-hr.

The crankshaft turns on seven main roller bearings and one combined main and thrust bearing. Lubrication is by spray. One oil pressure pump and two scavenging pumps are provided, one of the latter at each end of the crankcase, so that the drainage may be caught at whatever angle the ship may tilt. The VL-2 is a V-type engine and water-cooled. There are one intake and two exhaust valves per cylinder, these being operated from a common camshaft between the banks of cylinders. Two Robert Bosch magnetos are carried for ignition.

SEVERAL new sizes of drop forged vises have been brought out by the Fulton Drop Forge Co., Canal Fulton, Ohio. They include a 3-in. vise; a 4½-in. heavy duty vise and a 5-in. heavy duty vise. All are fitted with either solid stationary base or with Wedgelock swivel base.

Penna. S. A. E. Speakers Discuss Aircraft *Engine* Problems

Need for stiffer reliability tests is seen by E. P. Warner. Commander McCord of Naval Aircraft Factory outlines design trends and describes improvements.

THE reliability factor in aircraft engine design was stressed in two talks at the meeting of the Pennsylvania Section, Society of Automotive Engineers, in the rooms of the Philadelphia Automobile Trade Association, Oct. 9. The speakers were Edward P. Warner, Assistant Secretary of the Navy for Aeronautics, and Commander C. G. McCord of the Naval Aircraft Factory.

Secretary Warner said that too much importance cannot be attached to the reliability requirement and that, in view of the predicament that an aviator is placed in by the failure of a crankshaft or other major part, it is obvious that engine makers should subject their engines to reliability tests far more severe than any present service test.

Commander McCord pointed out that there is no general agreement as to just what is meant by the term "reliability" as applied to aircraft engines, but that in his opinion any engine which could successfully pass a 50-hour endurance test on 9/10 throttle was pretty reliable.

In a general discussion of aircraft powerplants, Commander McCord said that when the Bureau of Aeronautics of the Navy was formed it drew up a list of the different types of planes that would be needed by the Navy, these including not only seaplanes, but also some land planes, to which list amphibians were added later. A study was then made of the different engine types that would be needed for these planes, and the bureau recognized the importance of the air-cooled radial type of engine and encouraged the development of that type in this country from the beginning.

An outline was given of the tests applied to engines submitted to the Navy for approval. Lightness, of course, is an important consideration, because there are definite limits to the weight per square foot of wing area and the weight per horsepower that an airplane can safely carry. The restrictions on weight are much less severe in the case of airship engines, and these now generally weigh in the neighborhood of 6 lb. p. hp., inclusive of the reversing gear and starting gear. An interesting recent innovation in connection with airships is the water recovery apparatus. This apparatus adds to the weight and drag, but it has many advantages. The water is recovered from the exhaust from the engine which is led into a condenser of very thin material that is located in the air stream. More water is collected than the amount of fuel burned (about 117 lb. per 100 lb.).

Rivalry between the water-cooled engine and the air-cooled engine still continues, he said. The water-cooled engine weighs more than the air-cooled engine of equal power even when dry, and the drag and weight of the radiator are further points against it. Both air-cooled and water-cooled engines can be geared, and the gearing weighs about the same in both cases. The auxiliaries such as the magneto weigh about the same for a large engine as for a small one.

The time between major overhauls now varies between 300 and 350 hours, as compared with 100 hours in the case of the old Liberty engine. Engines for seaplanes must be so designed and installed that parts requiring frequent attention can be readily reached from the outside.

In testing air-cooled engines on the stand some difficulty is experienced in that the cooling effect of the air stream is lacking. To produce a similar cooling effect the Naval Aircraft Factory has large blowers mounted on the roof of the test room, and these deliver air through a shaft at speeds of 120-160 m.p.h. Endurance tests of engines are made on electric dynamometers. Some work has been done also in registering dynamometers for use in flights.

High Altitudes Simulated

Commander McCord referred to the altitude laboratory at the Bureau of Standards and said that at the Naval Aircraft Factory they did not go quite as far in reproducing conditions surrounding the engines at high altitudes, but they cooled the air entering the carburetors to 40-50 deg. below zero by passing it over ammonia pipes, and they discharged the exhaust into a chamber maintained at one-third atmospheric pressure by means of a vacuum pump, thus reproducing some of the conditions at 25,000 ft. altitude.

As regards aircraft engine accessories, Commander McCord said he regretted that the number of vendees or firms on the accepted list was so small. Possibly this was due to the fact that many firms considered the conditions too hard.

Considerable improvement had been made recently in

fuel pumps. On seaplanes the fuel has to be lifted from the tanks in the pontoons to gravity tanks on the wings, and in the past there were too few pumps that could be relied upon to raise the fuel against this considerable head under all conditions.

Carburetor requirements also are quite severe, since great temperature changes are met with every time an airplane goes up. Motor car owners are instructed to adjust their carburetors to compensate for seasonal changes in temperature, but the temperature range during a flight is often much greater than the seasonal temperature change at sea level. All carburetors must have compensating devices compensating for the differences in atmospheric density at sea level and high altitudes.

Starters as Regular Equipment

Up till recently the common method of starting aircraft engines was by swinging the propeller, but there are now a number of good mechanical starters, and the time is not distant when these will become regular equipment on all airplanes. The inertia type of starter has proved the most satisfactory. Some of these are brought up to speed by a hand crank and others by an electric motor. The latter, of course, require a storage battery, which adds materially to the weight, for which reason hand-inertia starters are used in the Navy for the most part.

There is no spark plug on the acceptable list at present, he said, that will meet all of the requirements of the Navy. Most of the spark plugs actually used are of the mica-insulated type. Spark plugs are tested first in a high-compression single-cylinder engine which detonates badly. After operating for five minutes under these conditions, the current is shut off, and if the engine then continues to fire for any length of time the plug is discarded. Those plugs which survive the single-cylinder test are screwed into a bomb which is put under pressure, and this bomb is immersed successively in cold water and in hot oil. There must be no electrical leakage after the first immersion and only little after the second.

At the present time at least five different manufacturers in the United States are developing light, high-speed Diesel engines, although one of these manufacturers is aiming at the production of a marine engine rather than one for aircraft.

As to future developments, the elimination of radiators would have an important effect in reducing the drag. It may prove feasible to place the engine—a horizontal type—in the wing and to use the wing surface for radiation. In lighter-than-air craft the power-plants may be put inside the bulbs, instead of in special power cars, which would cut down the drag materially. In that case only the propeller shafts would project from the hull.

Progress in Supercharging

Supercharging is making notable progress, and intercoolers are generally used with them. In some types of giant planes engines are mounted in tandem, and it has been found that the slip stream from the forward tractor propeller supercharges the rear engine. It was observed with such tandem engines that the carburetors of the forward and rear engines require different adjustments, and this was later found to be due to the supercharging effect.

Secretary Warner said a diversion of practice in aircraft engine design must be looked for and it would not be safe for engine manufacturers to assume that the final types of engine had been reached and hereafter it would be a matter of minor improvements and refinements only.

As a rule, engine makers cannot get reliable information from commercial users as to how good their engines really are, The Army and Navy are virtually running laboratories on a large scale that is constantly furnishing such information to engine manufacturers. It was the Navy that encouraged the Wright Aeronautic Corp. to take up the development of the air-cooled radial engine, and it has helped further in the development of this type of engine by its constant use of large numbers thereof.

At the present time an agreement on a specification for a fuel that can be used in all aircraft engines is badly needed. With the high compression ratios now used it is necessary to employ doped fuel, and the Navy uses lead tetra ethyl mainly. The ethyl fluid is carried along on the carriers and tenders, and can be mixed in with the fuel as desired. Private operators of aircraft cannot do this, as the regulations concerning the dope forbid its sale to the public except when dissolved in fuel.

Aircraft engines in use by the Government services operate under specially favorable conditions, inasmuch as they receive good service. It is not the same with respect to engines in private commercial services. They will be treated a good deal like passenger cars in the hands of private owners; that is, they will be looked after carefully for a while when they are new; then it may happen that the owner is too busy or is prevented from giving them the proper attention for some other reason, and when he sees that the engine does not fall apart in consequence, he will neglect it habitually thereafter. This may make it necessary to produce a special foolproof engine for commercial services.

Diesel Engines Coming

Mr. Warner also referred to aeronautical Diesel engine development and said he fully expected the Diesel to reach a practical state for this line of work within a reasonable time. He did not expect to see it entirely displace the carburetor-type engine, but to find wide application in the aircraft field.

In the discussion, J. H. Geisse, chief engineer of the Aeronautical Engine Laboratory of the Naval Aircraft Factory, who acted as chairman, said that the Navy now has some engines which require a major overhaul only once every 500 hours of flying, or after about 50,000 miles of service. He also said that an engine has been developed which is cooled by means of a high-boiling point liquid in its jackets, entirely dispensing with a radiator, which is a great gain.

Capt. R. W. A. Brewer said that in the British Air Service it takes 700 man-hours to make a major overhaul of an engine, and since airplane engines used in such far-off sections as Iracq have to be brought to England for an overhaul, it happens quite frequently that they are out of commission for a period of three months. This is a serious matter, and engineers should make a study of just what are the causes that call for overhauling and seek to eliminate these. He also mentioned that in the British Air Service there are sixty men of personnel behind every pilot.

It was asked whether it was true that the Government made certain requirements of aircraft engines and would not allow the sale of engines that did not meet these requirements. To this it was replied that the Department of Commerce had certain specifications for aircraft engine tests which called for 50 hours' running under the full rated power of the engine, and one hour under an overload of 10 per cent.

Hardest Steels *are* Machined With New *Cutting* Tool Material

Carboloy, combination of tungsten carbide and cobalt, cuts glass like diamond and resists wear even when working against such materials as Genelite and Bakelite.

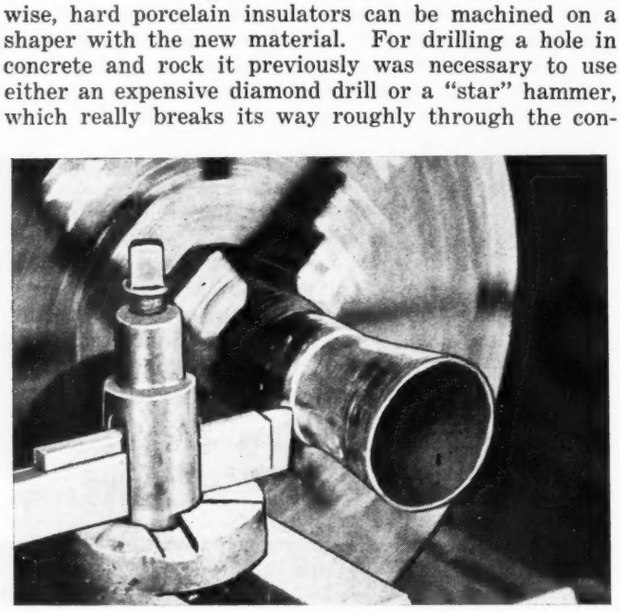
A NEW and extremely hard tool material known as Carboloy was displayed at the National Metal Exposition in Philadelphia by the Carboloy Co., Inc., Schenectady, N. Y. Particulars concerning the development on the alloy in the research laboratory of the General Electric Co., and its properties were given in a paper presented at the meeting of the American Society for Steel Treating by Dr. S. L. Hoyt of that laboratory.

The new material is composed of tungsten carbide and cobalt, the carbide supplying the hardness and the cobalt the necessary strength for cutting tools. The following details are based upon information furnished by the General Electric Co.

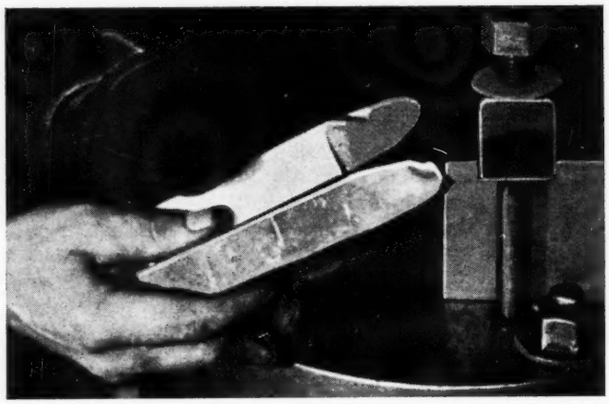
In experiments conducted with molded materials containing metal inserts, such as fabric gears used in automobiles, cobalt-chromium alloy cutters, which had given the best previous service in this work, required redressing for every 150 parts machined; the new tungsten carbide tools, operating under identical conditions finished 11,000 parts before they required sharpening.

Cuts Thread on Glass

Usual cutting tools will not affect a glass rod; instead a rod of glass in a lathe will wear off the edge of a cutting tool that is pressed against it. The tungsten carbide tool quickly cuts into the glass, and can even be used for cutting a screw thread into the rod. Likewise, hard porcelain insulators can be machined on a shaper with the new material. For drilling a hole in concrete and rock it previously was necessary to use either an expensive diamond drill or a "star" hammer, which really breaks its way roughly through the concrete. A drill made with the new cutting material has advantages over both of its predecessors, in that it is less expensive than the diamond drill and that it cuts a smoother hole than does the "star" hammer drill.



Cutting glass on a lathe with Carboloy. Start of the cut



Comparison of high-speed steel and Carboloy cutters after use on nickel steel test log. The steel cutter (lower) is burned; the Carboloy cutter (upper) has not been affected

Hadfield's manganese steel, previously in the non-machinable class of metals, was found to yield so easily to the new cutter that commercial operation is expected to be developed. Similarly, in the General Electric research laboratory it has been found that numerous experimental alloys can be handled by tungsten carbide cutters, although not with the usual tools. It was found that even a block of quenched high-speed steel could be machined on the shaper with the new material, although with difficulty, and that the same held true with the super-high-speed cobalt-chromium alloys.

In testing high-speed steel it is customary to use a nickel-steel test log, operating at about 50 ft. p. m. Because of the lack of effect on the new cutter, however, it was necessary to increase the speed to 200 ft. p. m. At this higher speed a high-speed steel cutter failed in 16 seconds, with its edge burned off. The tungsten carbide tool, operated under identical conditions, was run for an hour before the test was arbitrarily stopped, and the tool was still cutting and capable of cutting for a much longer period of time. In another run with a test log of chromium-nickel steel, with a cut of $\frac{3}{8}$ in. and a feed of $\frac{1}{8}$ in., good high-speed tools failed in from six to eight minutes when operated at 35 ft. p. m.; Carboloy tools, with the same cut and feed but at 70 ft. p. m., twice the speed, showed but little wear after 10 minutes.

One difficulty with today's tools has been that wear of the tool causes a taper. In machining a hollow cyl-

inder of carbon, for instance, the best tool steel loses its cutting edge and begins cutting a taper soon after starting; tungsten carbide tools take an entire cut without tool wear, and hence without tapering.

Genelite, composed of copper, tin and carbon, is so soft that it can be whittled with a knife, but it is also so abrasive that it dulls a steel tool almost at once. A cut on a small cylinder of only a few inches length has always shown a taper; here again the tungsten carbide tools have not been worn, and hence the cuts are not tapered.

The bearing surfaces of commutators of electric motors, of alternate layers of mica and copper, have always presented a problem, since they must be accurately machined and since mica is very abrasive. Here also the new material gives a smooth finish without undue wear.

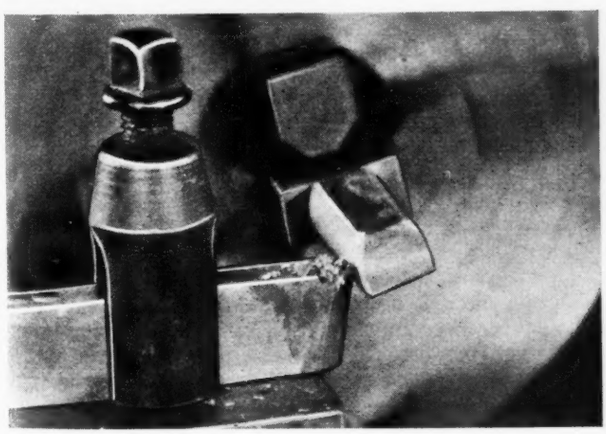
For Molded Compounds

Molded compounds, such as Bakelite and hard rubber, also wear tools quickly. Diamond tools are used with Bakelite, the precious stone being the only material to stand up at the high cutting speeds used. If the Bakelite contained a metal insert, however, a special operation was needed, since the diamond would be broken if it struck the metal at high speed. With Carboloy no special operation is required, it is claimed.

When considering cast iron, cutting conditions are found to be much different. The parts are frequently large, the cutting speeds are lower, the cuts are heavier, and the tool pressures greater. One of the most difficult jobs with cast iron has been the removal of the surface layer of chilled metal, particularly if the surface contains sand. The chilled iron and sand are harder than tool steel, so that the edge of the cutter is taken off almost at once. Tungsten carbide, however, is harder than the surface of the cast iron, so that it can handle work of this kind without difficulty. In fact, the same speeds and feeds can generally be used for the surface as for the sub-surface cuts.

Hard castings can be handled as easily as soft ones with the new material and intermittent cuts are also handled satisfactorily.

The windows in the laboratory rooms bear witness to the extreme hardness of the new cutting material, deep scratches having been made in the glass, just as though a diamond had been used. Natural sapphire, next below diamond in the scale of hardness, is also scratched by the tungsten carbide. If Carboloy is held against the side of an emery grinding wheel, a deep, narrow groove is worn in the stone, without the Carboloy suffering much loss, whereas ordinary tool materials are worn away.



Cutting a high-speed steel cutter in a lathe with Carboloy

When it came to determining quantitatively the hardness of the new cutter, it was found that the Rockwell test could not be used, as the point of the diamond penetrator wore and crumbled in too short a time when it was loaded with a weight. It was necessary to use the penetrator without a load. The test showed that common hardened tool steel has an average maximum hardness of 850 on the Brinell scale, that the hardest steel may be taken as about 1000, and that the hardness of Carboloy runs 2000 and above.

The addition of cobalt to the tungsten carbide increases its strength to more than half that of high-speed steel. Tungsten carbide without cobalt has a strength of less than 50,000 lb. p. sq. in., Carboloy up to 275,000 lb., and quenched and tempered high-speed steel 425,000 lb.

Another important property of a cutter is toughness, and the new material will withstand quite severe blows of a soft peen on the edge of a bar. A supporting block of copper shows marked indentations as a result of the blows on the edge of the material, but the edge does not crumble. The strength and toughness of the material are further shown by its ability to take intermittent cuts on metals.

The tungsten carbide material does not pit or tarnish, and is dissolved in acids only with great difficulty. The moderate temperatures involved in cutting metals at the speeds generally used have not been observed to be harmful; but, if the speed is raised too high and the abrasion is severe, small particles of carbide may oxidize and shoot off from the edge as sparks. Ordinarily the temperatures involved simply produce temper colors, much the same as they do with high-speed steel.

The material retains its strength and hardness at elevated temperatures to a remarkable degree. Tools have been observed cutting nickel steel when the point of the tool was at a bright red heat, without showing ill effects. The material has no "temper" to be "drawn" by the heat generated.

German Yearbook Out

THE Yearbook of the German Association of Automobile Manufacturers (Jahrbuch des Reichsverbands der Automobilindustrie) has recently made its appearance and compares very favorably with the previous editions of the same work. It was produced under the direction of Dr.-Ing. Scholz, an official of the association, and contains, in addition to an economic-industrial review of the year, numerous articles of interest to automobile manufacturers. The publisher is Dr. Ernst Valentin Verlag, Mockernstrasse 144, Berlin.

Engineering Aerodynamics

Walter S. Diehl. The Ronald Press Co., New York. 288 pp. Illus. $7.

THIS is another volume in the Ronald Aeronautic Library and, as its title indicates, has been prepared for the purpose of providing practical information on aerodynamics in forms suitable for direct application both by airplane designers and by advanced students in aeronautical engineering. A large number of equations and charts are included to simplify analysis of data while little space has been given to test description or methods. The volume thoroughly covers the airplane field including, as it does, chapters on wings, models, control surfaces, parasite data, engines and propellers.

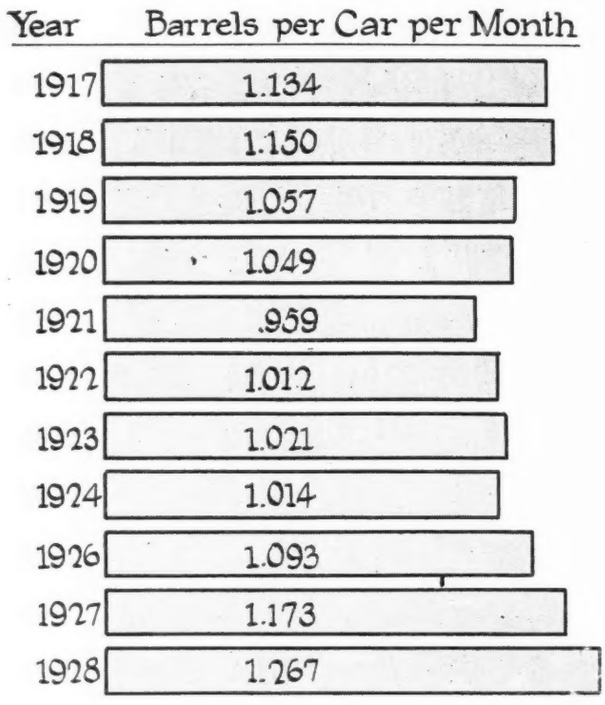
Increasing Use of Motor Vehicles Reflected in Fuel Statistics

Gain in gasoline consumption in recent years attributed to greater mileage per car per year, although trend toward larger engines may also be factor.

SOME rather interesting calculations concerning the seasonal variation in motor vehicle operation are given in a recent bulletin published by the National Association of Finance Companies of Chicago, which lead to other conclusions concerning the type of cars most desired by American car operators.

Since there is no known way as yet for obtaining directly any accurate estimates of motor vehicle mileage or the extent to which cars are operated throughout the year, approximations must be made and for this purpose gasoline consumption appears to be the most desirable.

Of course, there are many other purposes for which gasoline is used. Motor boats, tractors, stationary engines, cook stoves, lamps and other things make some inroads on gasoline consumption but their total is so small in comparison with the total consumed that this information still is suitable for estimating motor vehicle use.



Gasoline consumption as related to cars in use

In an accompanying chart compiled by the N.A.F.C., is shown the average daily amount of gasoline consumed during three previous years and the average gallons consumed per car. Both of these curves demonstrate the presence of a pronounced seasonal variation in car mileage.

It is likely that if these curves were extended back several years further there would appear a much sharper variation between summer and winter operating activities than are indicated during the past three years. The old-time custom of placing the car in the garage when the first snow falls and leaving it there until spring has mostly passed. This trend is due not only to improved roads but to the growing utility of motor vehicles and probably also their better performance under unfavorable weather conditions.

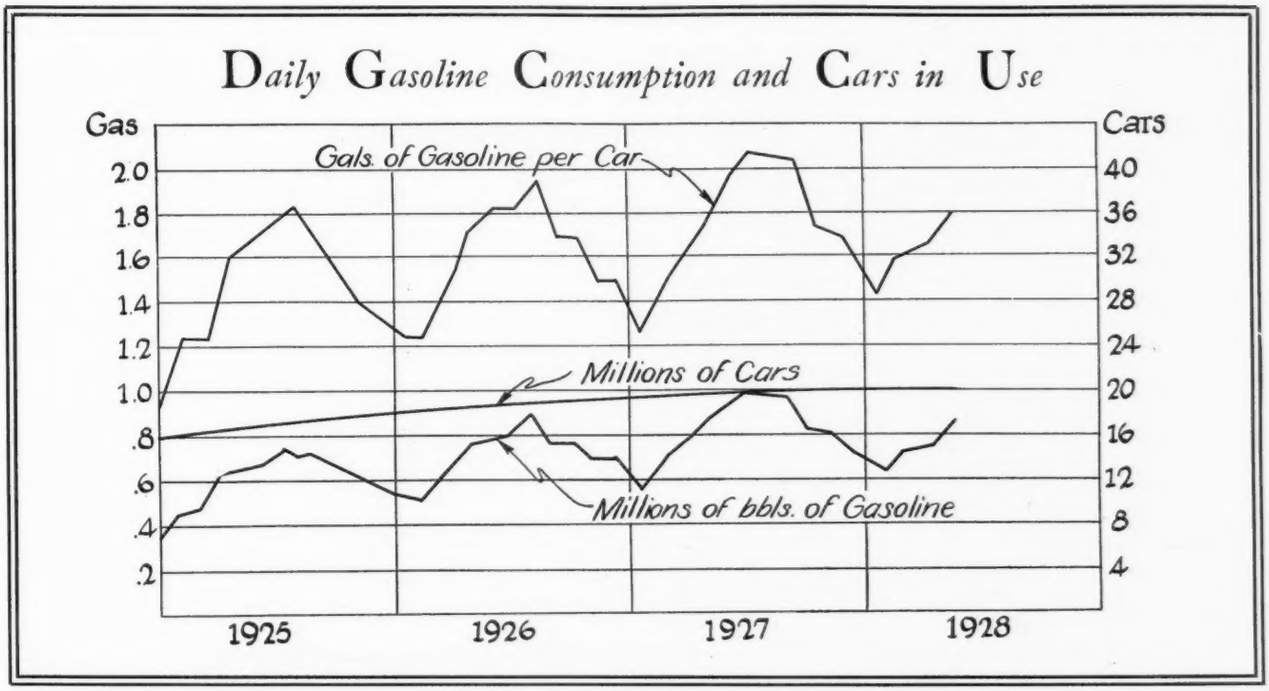
The curve showing the average consumption of gasoline per car shows not only a seasonal variation but an increasing consumption per car each year. In view of the fact that many of the improvements made in powerplant design have tended to increase the mileage obtainable from a gallon of fuel, this tendency seems to require explanation.

One reason, and probably the most important, is concerned with the tendency already referred to of greater winter use of cars. It is altogether likely that automobiles are being run considerably farther than they were a few years ago. This is brought about as much by the spreading of the operating season over 12 months instead of eight or nine as by the increasing mileage of good roads which have made long and frequent automobile trips possible.

Another factor in this situation, however, is the present desire of the average car owner for performance based on acceleration and speed rather than fuel economy. Up to the present time, at least, fuel economy has been but a minor selling point in this country, although in European countries it has been a major one.

The American car owner appears to regard the accelerating ability and speed possibilities of his car as of considerably more importance than the amount of gasoline it burns and engine designers have catered to this desire.

As outlined in an article appearing in the last Annual Engineering Issue of *Automotive Industries*, there has been a constant increase in the average power developed by engines during the past few years, and of the means available for accomplishing this, increasing the piston displacement has been a popular one. Of course, there are many other items entering into the question of fuel economy besides piston displacement but, by and large, it is safe to say that the larger the engine the more fuel it will consume to propel the vehicle a given distance.



In this connection then it is interesting to see how engine design changes may have influenced the curve of gasoline consumption per car over the past few years. The weighted average piston displacement of all cars sold during 1926 was approximately 199 cu. in.; that of 1927 was 234 cu. in.; and for the first six months of 1928 the average displacement was about 255 cu. in.

This continued increase in the size of the average engine has not been obtained simply by increasing the proportionate number of six and eight-cylinder cars sold, although this has helped of course—but as well by actual increases in the average displacement of all cars whether of four, six or eight cylinders.

In a second chart herewith is given for 11 years, beginning with 1917, the average gasoline consumption per car per month, which indicates that the amount used per car has been increasing since 1921, having been declining for the four years prior to that date.

Whether it necessarily means anything or not there appears to be some relation between the percentage increase in fuel consumption per car and in average piston displacement. The average piston displacement figures used here are for the sales of three and a half years only, which, while representing nearly 50 per cent of all cars now in use, still comes far short probably of a fair average for the ten million or more cars in use which were built prior to 1925.

Coordination of Transport

A NEW scheme designed to solve some of the problems arising out of the competition between rail and road transportation has been proposed by M. Paul, general manager of the French Southern Railroad, and is referred to by a correspondent of *The Engineer* of London. It has been laid before all of the transport interests, and a sort of program has been based upon it which will be submitted to the Minister of Public Works for acceptance by all of the public and private transport enterprises.

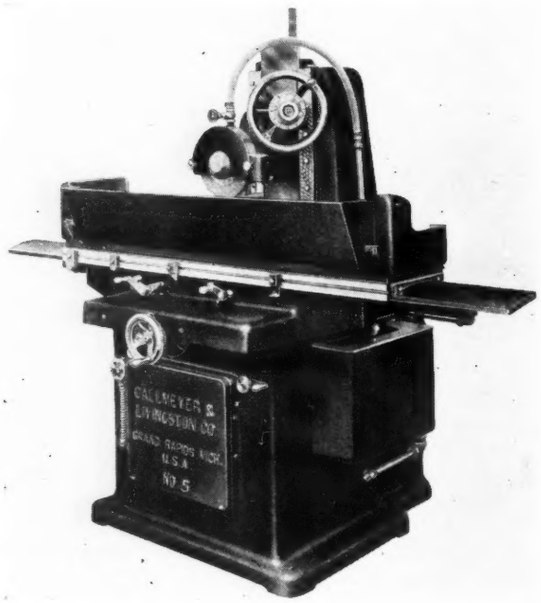
In connection with each railway company there will be formed a Société Auxiliaire de Transports to which will belong all the existing public and private concerns operating within the region covered by that company. Most of the capital will be subscribed by the railway company, which will thus have a controlling interest, but the auxiliary company will be independent of the railway in the sense that the private interests will be maintained, although the services will have to be run according to plan, and new lines will be created where necessary.

As there will be as many Sociétés Auxiliaires de Transports as there are railway companies, and all will be under the control of the central railway managing committee, the scheme really amounts to an amalgamation of all the road transport services throughout the country.

The services will be organized according to a definite plan which aims at developing traffic in districts away from the railways, to which the motor vehicles will, at the same time, act as feeders. They will also link up the railways across country. The scheme is not restricted to motor car traffic, but covers every means of transport.

ACCORDING to the *Chemical Trade Journal*, an interesting process for the production of high-viscosity oils from oils of low viscosity by the action of the silent electrical discharge is now being worked on the commercial scale in Germany. The process is equally applicable to animal, vegetable and mineral oils, but it is obvious that the last mentioned will be employed, as they are so much the cheaper today. By varying the duration of the treatment, lubricating oils of any desired consistency may be obtained, but in practice an intermediate stage of polymerisation is aimed at as prolonged treatment is uneconomic. It is stated that with these oils, viscosities of 100 Engler units are obtained at a temperature of 100 deg. Cent., as compared with mineral oils which have only viscosities of one to two Engler units at this temperature. Another field of application for these Voltol oils is in the production of lubricating oil emulsions in which they can replace either wholly or partially the tar distillates.

NEW DEVELOPMENTS—Automotive



Grand Rapids No. 5 hydraulic feed surface grinding machine

Surface Grinding Machine

A GRAND RAPIDS No. 5 hydraulic feed, surface grinding machine has recently been added to the line of grinders being made by Gallmeyer & Livingston Co., Grand Rapids, Mich. Operating features made possible by the use of an Oilgear hydraulic feed are numerous. No gearing is used in any table or saddle movements so that gear tooth marks on the finished work are eliminated entirely.

Longitudinal table feeds varying from practically nothing up to 55 ft. per min. are available by the movement of a single wheel. Feeds may be set so slow as to require nine hours to cover the entire working surface of the table or they may be set so fast as to cover this area in 3½ min., or anywhere between these two extremes.

The Oilgear unit is connected to a cross feed engine which is arranged to actuate the cross feed mechanism at each reversal of the reciprocating table. It may be set to operate at each end of the stroke, or at only one end, and to feed either in or out.

For rapid adjustment of the wheelhead up or down, a large handwheel is provided. This gives a direct action through a worm and gear to the elevating screw. The hand wheel is graduated in one-quarter thousandths of an inch. A smaller wheel is also provided which brings a back geared action into play, by means of which settings within tenths of thousandths are readily made.

The base of the machine and its column are combined in a single casting weighing over one ton, assuring a rigid foundation. The spindle head is fitted to the vertical ways with care and carries an extra heavy spindle with a minimum of overhang. The machine can be furnished either for countershaft or direct motor drive and for either wet or dry grinding.

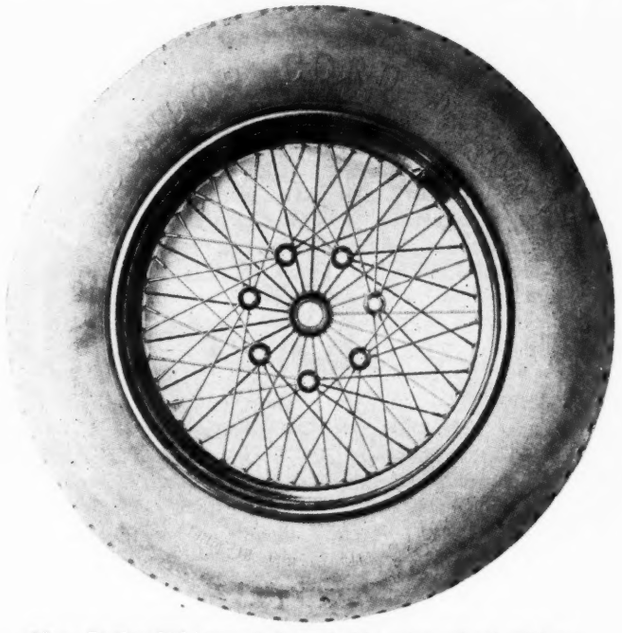
Wire Wheel Has No Hub

RUDGE-WHITWORTH, LTD., Coventry, England, the originators of the R.W. wire wheel, have introduced a new and revolutionary type, the special feature of which is the elimination of the hub in the accepted sense. As a result, a saving of weight to the extent of 40 per cent is effected and strength is increased. For example, the ordinary R.W. wire wheel, with central lock-nut to secure the hub to the axle, and a 19 by 3½ in. well-base rim for 27 by 4.4 in., 28 by 4.75 in., or 28 by 4.95 in. straight-side tires, weights 18 lb.; the corresponding wheel of the new type with the nuts to secure it weighs only 11 lb. This saving, it is to be noted, is not only unsprung weight but rotating weight, which, it is held, is worth nearly twice the saving on the sprung weight of a car.

The wheel appeared at the Olympia Show and is being offered to automobile manufacturers.

The wheel is intended to be secured to the hub of the car by the screwed stud and nut type of fixing, which is universally applied to British and Continental cars with hollow-spoked steel wheels, and to some examples of wire wheels with integral hubs. That being so, the inner row of spokes is secured at the inner ends to a series of eyelets, the number of the latter depending upon the number of fixing studs in the hub; three, four and five are the numbers generally used, though the wheels used for a Panhard Eight and illustrated herewith are exceptional in having seven studs and consequently seven eyelets for the inner spokes. A much simpler design results when one of the smaller numbers of studs and eyelets is adopted. Four is considered ample for most cars.

The outer row of spokes is secured to a cone and, as in the case of the eyelets, this cone is provided with



New Rudge-Whitworth detachable wire wheel without hub; the eyelets anchor the inner series of spokes and the central coned ring the outer series

Parts, Accessories and Production Tools

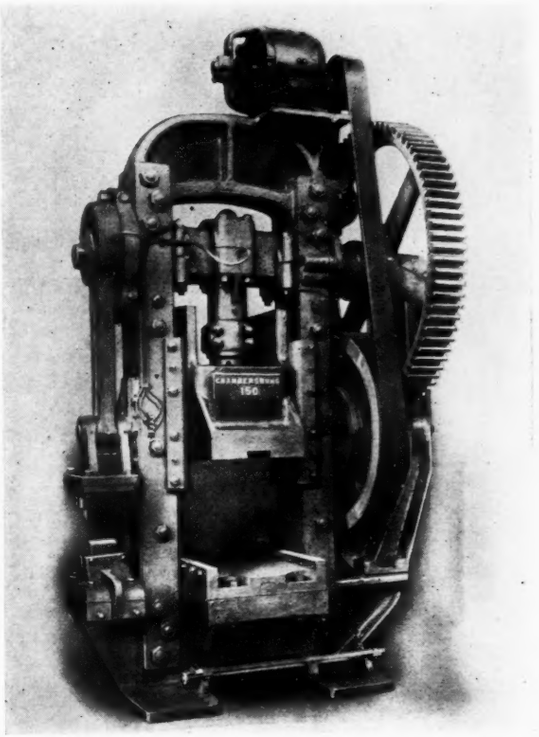
accurately tapped holes into which the inner ends of the spokes are screwed, the outer ends—within the rim—being headed. By this arrangement two other benefits are secured, viz.: the elimination of nipples and perfectly straight spokes, the latter giving much better results than the usual bent spokes. In a reciprocating test, in which the tension of the spokes varies from about 300 lb. minimum to 1800 lb. maximum, the new straight spokes stand up nearly 10 times as long as the bent ones.

Another point of note is that, owing to the absence of any part forming a distance-piece between the eyelets and the cone into which the inner and outer spokes respectively are screwed, the tension of the spokes of a spare wheel is practically at zero; but when the wheel is fitted to the car hub the inner series of spokes is forced away from the outer series, so tensioning all the spokes correctly. It is found, in fact, that by this principle of construction much more uniform and accurate tensioning is obtained.

The design of fixed hub for this wheel can be varied in several ways. It can have a large diameter inner flange for the screwed and riveted inner ends of the driving studs, which can be used to carry a separate brake drum; or a small hub flange can be used with studs for the brake drum, while the latter, at a greater radius from the center of the axle, can carry the driving studs for the wheel. As another alternative, the hub and brake drum may form a unit secured in the usual way to the axle end and carrying the requisite driving studs for the wheel.

In any case the abutment for the cone of the outer spokes will consist of a screwed-in hub cap, suitably machined to form a good seating for the cone.

How the new hubless wire wheel is secured. Seven studs and nuts are used in this case, but three, four or five will usually be adopted



Chambersburg steel side trimming press

Steel Side Trimming Press

A NEW steel side trimming press has been brought out by Chambersburg Engineering Co., Chambersburg, Pa., which has been designed to eliminate the danger of side frame breakage as a hazard of press operation. The side frames are I-section steel forgings and have heavy semi-steel bed frame and yoke. Use of this design in connection with an oversize crank, outboard bearings and a patented friction slip flywheel makes the press capable of continuous operation.

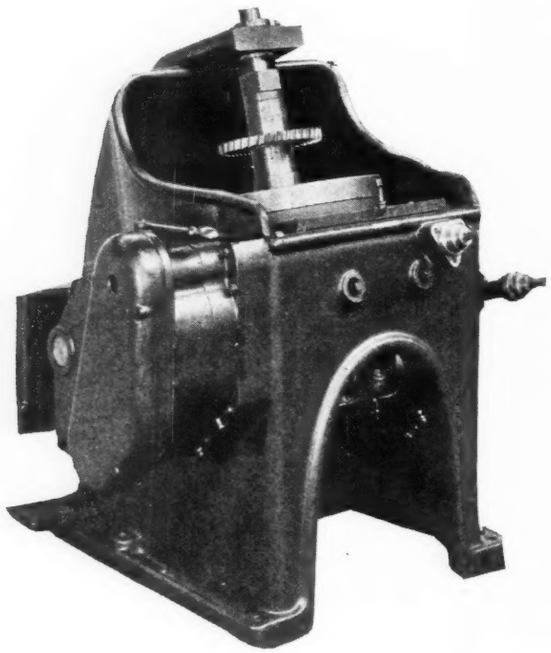
The friction slip flywheel eliminates the hazard of flywheel bursting or the crank or gears being broken when an overload stalls the press. The energy developed by a sudden stop is expended in slipping the flywheel on its hub against friction.

Other new features of this press are roller bearings on all auxiliary shafts; directly renewable clutch jaws and cam; a pitman adjustment grips the length of the screw; high pressure grease lubrication to all bearings and surfaces; improved clutch operation and easier treadling and reduced floor space requirements. The press is supplied in either single or double crank construction.

Tilted Offset Miller

THE Osterlein Machine Co., Cincinnati, has recently brought out a new 28-in. tilted offset miller which is, in general, similar in design to other machines of

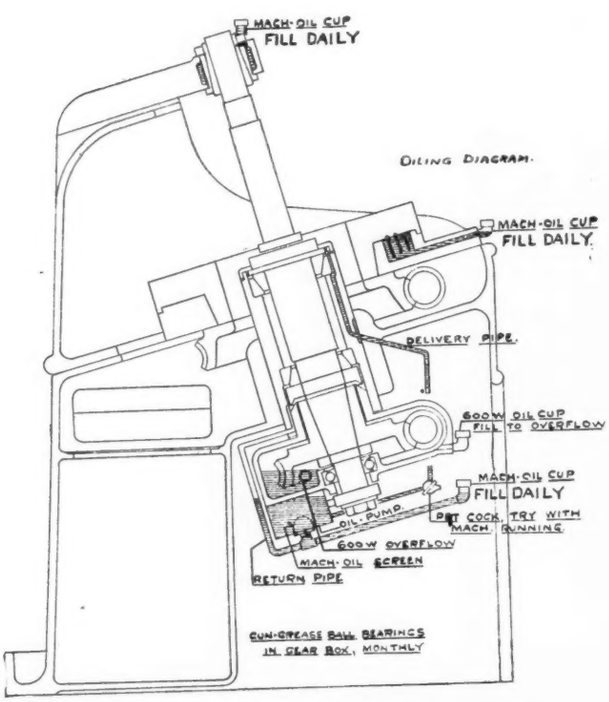
this type previously brought out by this company. The newest machine is intended for use on such jobs as flattening the heads of connecting rod bolts, slotting screws, milling small clevises and yokes, sawing operations and straddle and face milling on other small parts.



Osterlein 28-in. tilted offset miller

The work-holding fixtures are provided with means for automatically clamping, unclamping and ejecting parts, thereby leaving all the operator's time for loading, which is the limiting factor in production from the machine. Some of the features incorporated in this new machine are provision for 20 gal. of coolant per min., a large chip basin within the base, frictionless bearings throughout, a highly efficient lubrication system, as shown in an accompanying illustration, and heat-treated multiple splined gears and shafts.

The machine has an 18-in. diameter table, swings 28 in. diameter, provides 14 in. from the table to the outboard arbor bearing, uses a 2¾-in. diameter arbor, weighs 2600 lb. net, and is driven by a 3 hp., 1800 r.p.m. motor mounted on the back of the machine with chain drive.



Oiling diagram of Osterlein tilted offset miller

B & B Products on Market

THE B & B line of flowmeters and jet calibrating machines made by Amalgamated Carburetters, Ltd., Holford Works, Perry Barr, Birmingham, England, is being offered for sale in this country.

The jet calibrating machine was developed in response to a need for some method of calibrating discharges from airplane engine carburetors. The same diameter jets were found to give widely different discharges under identical conditions, making it necessary to use the trial and error method of selecting the proper jet. The calibrating machine permits measurement of the discharge of any jet in comparison with that of a standard jet in a few seconds.

The line of flowmeters has been developed with the object of furnishing a means of indicating the actual consumption of fuel at different loads and speeds when an engine is under test, and have since been adopted by the British Government as a standard for testing aircraft engines. Features of the flowmeter which were required before they were accepted by the Government included accuracy within 2 per cent—tests made indicate their accuracy is actually within less than 1 per cent—steady indication at any rate of flow within its range, maximum possible range of scale to be obtained and the length of connections between the instrument and the engine not to affect accuracy.

Flowmeters are made in three types with capacities ranging from 1½ pt. per hour to 120 gal. per hour.

Paint Ventilating Unit

AN explosion-proof ventilating unit for use in air-finishing booths is the latest development of Paasche Airbrush Co., 1909 Diversey Parkway, Chicago. The new unit is a combination motor and fan so designed that none of the paint fumes can touch the motor bearings. The unit is fully inclosed and is designed to be mounted on top of the spray booth outside of the path of the fumes.

The motor is cooled by screened air which is pulled over it and which prevents any possibility of explosions. The fan is a three-bladed type of aluminum, is easy to remove and clean and is efficient in handling large volumes of air. The unit is made in four sizes to provide displacement of air from 2700 cu. ft. per min. to 16,000 cu. ft. per min.

THE Alexander Milburn Co., Baltimore, Md., announces a new type of carbide light which operates with either carbide or carbic cakes. This new development provides a light or welding generator with extra gas storage space. The center of the carbide container is a cylinder which holds the carbic cakes while the outside of the container is filled with conical pockets for ordinary carbide.

This new light is supplied in 8000 and 12,000 candle power and in duplex lights of 16,000 candle power.

Instalment Selling... Industry ...*and* Speculation

INSTALMENT selling is under fire again. Two bank officials and an insurance executive have just issued warnings to the effect that

(a) Consumer credit is an important factor in the persistent expansion of bank loans;

(b) Consumer credit is working "havoc in so many families."

Are these facts?

Consumer credit largely goes to automobile purchasers, yet the most recent figures available indicate a decline in the proportion of time sales.

There are no visible signs of havoc in very many families. Repossessions have declined, savings deposits and life insurance have expanded, and economic distress is rare.

PERHAPS the bankers have in mind merely eliminating the outward fringe, the virtually insignificant minority of time sales transactions that overburden the consumer.

But they don't say so specifically, and the effect of their statements is to revive all the old doubts on the subject of instalment selling.

Facts that can hardly be questioned are that brokers' loans, made for speculative purposes, are around the five billion dollar mark, whereas the average outstanding credit to consumers on time payment sales is not over 2500 millions.

Curtailment of brokers' loans might have a constructive effect in the long run. Curtailment of credit to consumers, on any significant scale, would spell depression for the country's largest manufacturing and exporting industry, as well as several others.

Probably, if it came right down to cases, the bankers would rather sustain industry than speculation.—J. C. G.

First with the News

Reliable and Accurate

News of the Industry

PAGE 568 VOLUME 59 *Philadelphia, Saturday, October 20, 1928* NUMBER 16

Factory Operations Hold Close to Record Levels

PHILADELPHIA, Oct. 20—Sustained demand for cars and trucks is continuing factory operations at a rate far in excess of the usual fourth-quarter level and only slightly lower than in the record-breaking third-quarter just closed. Although there are a few signs of slackening, prospects are that the closing months of the year will maintain a high seasonal activity.

There are as yet no signs of any extensive stocking of new cars by dealers and several factories are behind in meeting dealer demand. Ford Motor Co. and at least one other large producer in the low priced field have large back orders from dealers, while several producers of medium and high priced lines have orders which will require close to capacity operation through the year.

Announcements by two important manufacturers of plans for European sales in 1929 give indication of the greatly increased demand for American cars which is expected in the coming year. An outstanding increase is indicated in Germany. In the development of increased foreign business manufacturers will be aided by much more extensive arrangements for financing sales.

Bendix Corporation Buys Major Interest in Eclipse

DETROIT, Oct. 17—Bendix Corp. has purchased from General Motors Corp. a majority interest in the Eclipse Machine Co., Elmira, N. Y., according to W. J. Buttener, vice-president of Bendix. The present management will continue under J. C. Ferguson as president, he said. Announcement of the purchase of a minority interest in Eclipse by Electric Auto-Lite was announced last week.

Dunlop Links Interests

NEW YORK, Oct. 17—Closer linking of the Dunlop tire interests in the United States, Great Britain, Canada and the Far East are seen in the working out of plans under which the Tyre Investment Trust of Great Britain will be the holding company of the various interests. Sir George Beharrell, managing director of the British company, is now in the United States visiting the Buffalo plant, following a visit to the Canadian company.

M. & A.M.A. Enlarges National Show Space

NEW YORK, Oct. 17—Demand for space in the shop equipment and parts and accessory portions of the national automobile shows has been so great that the Motor & Accessory Manufacturers Association has found it necessary to enlarge the space allotted in the New York show and to provide for overflows in the Chicago show where space is more limited.

In this year's show there will be 45 shop equipment manufacturers participating and 63 manufacturers of parts and accessories, which will include manufacturers of engines, bodies and other original equipment, as well as service parts and accessories.

Notable in this section will be the large number of companies exhibiting paint spraying and finishing equipment and car washing apparatus. Besides these there will also be shown and demonstrated complete lines of heavy service equipment, air compressors, electric tools, electric testing and repair apparatus, motor reconditioning machinery and other speed tools.

Walker Erie President

ERIE, PA., Oct. 18—E. E. Walker has been elected president of the Erie Malleable Iron Co., and G. R. Metcalf, Sr., president for many years, has been named chairman of the board. Mr. Walker formerly was vice-president and general manager.

Henderson Reelected

NEW YORK, Oct. 17—The New York Rubber Exchange yesterday reelected F. R. Henderson of F. R. Henderson Corp. as president for his third term in that post. Charles T. Wilson was reelected vice-president and J. C. Cuppia, treasurer.

Engineering Council Ready With Signs

NEW YORK, Oct. 15—The American Engineering Council has completed its standard for traffic signs and signals to be used in connection with the recently adopted model municipal ordinance drawn up by the National Conference on Street and Highway Traffic.

This standard, drafted by the Engineering Council, recommends standard sizes, coloring and lettering for all types of street traffic signs and also indicates suggested approved methods for mounting of traffic lights.

Chrysler Acquires Site for 68-Story Building

NEW YORK, Oct. 17—Walter P. Chrysler has acquired a 60-year lease on property on east side of Lexington Ave. between Forty-second and Forty-third Streets and plans to erect a 68-story skyscraper on this site. The proposed building will be 808 ft. high, 16 ft. higher than the Woolworth Building.

This project is a personal one on the part of Mr. Chrysler and in no way involves his motor interests. He has organized the W. P. Chrysler Building Corp. for the purpose of directing this building.

Panhard Here on Visit

NEW YORK, Oct. 17—Paul Panhard, manufacturer of the Panhard-Levassor automobile, arrived last night on the S.S. Ile de France for a visit to this country. He is accompanied by H. Dran and P. Paquelin, two of the executives of his company, and Louis Cuny and August du Truex, two engineers of the company.

300 H.P. Whirlwind Tested

NEW YORK, Oct. 16—Test flights on the new Wright Whirlwind J-6 300 hp. air-cooled engine were recently made by Col. Charles A. Lindbergh, who visited the Wright plant at Paterson, N. J. This engine has 85 more horsepower than the old Whirlwind and weighs 20 lb. less, according to Guy H. Vaughan, vice-president of the company.

G.M. Retail Sales 148,784 in September

Total for First Nine Months 1,576,708—Division Sales 1,606,902

NEW YORK, Oct. 15—General Motors Corp. dealers sold 148,784 cars to consumers during September, according to announcement from the office of Alfred P. Sloan, Jr., president. This is a gain of 12.2 per cent over September of last year bpt represents a decline from August figures of this year.

Sales of General Motors divisions to dealers totaled 167,460 cars, an output of almost 7800 cars per working day, and represents an increase of 19.1 per cent over September of last year.

Retail sales for the first nine months this year total 1,576,708 as against 1,266,445 in the first nine months of 1927. Sales by divisions to dealers in the first nine months total 1,606,902 as against 1,316,597 last year. The surplus of sales by divisions over sales by dealers in the nine months this year is 30,194 as against 50,152 last year.

Detailed figures follow:

Dealers Sales to Users

	1928	1927
Jan.	107,278	81,010
Feb.	132,029	102,025
March	183,706	146,275
April	209,367	180,106
May	224,094	171,364
June	206,259	159,701
July	177,728	134,749
Aug.	187,463	158,619
Sept.	148,784	132,596
Total	1,576,708	1,266,445

Divisions Sales to Dealers

	1928	1927
Jan.	125,181	99,367
Feb.	169,232	124,426
March	197,821	161,910
April	197,597	169,067
May	207,325	173,182
June	186,160	155,525
July	169,473	136,909
Aug.	186,653	155,604
Sept.	167,460	140,607
Total	1,606,902	1,316,597

Midland Earns $837,961

CLEVELAND, Oct. 18—Midland Steel Products Co. reports for the third quarter, earnings of $837,961 after charges but before Federal taxes, equivalent to $3.37 a share on common. This compares with $583,847 in the same quarter last year. Nine months' earnings in 1928 were $2,361,325 or $9.52 on common, against $1,929,205 in the same period last year.

21 x 2.75 Leading Rim Size

CLEVELAND, Oct. 17—Total rims inspected in the first nine months this year was 19,818,233, according to the Tire & Rim Association of America. This compares with 20,015,170 in all of 1927 and with 24,199,842 in all of 1926. The largest output of any one size was of 21 x 2.75 balloons which made up 23.6 per cent of the total against 1.2 per cent last year. Next leading sizes were 20 x 4 balloons with 14.4 per cent, and 19 x 4 balloons with 10.9. The leading truck size was 30 x 5 20 in. truck with 8.6.

Jordan Reelected, New Board Named

CLEVELAND, Oct. 18—Jordan Motor Car Co. has announced the organization of a new board of directors, and has revealed that Jordan stockholders have subscribed to more than 90 per cent of the treasury stock recently offered. The financial statement of the reorganized company, which will be made public shortly, it is understood, will show assets of about $9 to every dollar of liabilities.

Edward S. Jordan, who has headed the company for the past 12 years, has been reelected president, while John McArdle, who was with Chrysler for eight years, has been made vice-president and general manager.

Directors are J. A. House, president of the Guardian Trust Co., Cleveland; J. G. Fischer, vice-president of the Marine Trust Co., Buffalo; Roger Sherman, a director of Continental Motors Corp.; T. Ernest Borton of Borton and Borton, Cleveland, and A. F. England, newly chosen secretary and treasurer of the Jordan company. Mr. England was formerly comptroller of the Copeland Products Co. of Detroit, and previously was associated 14 years with Maxwell and Chrysler as an executive.

Following a meeting of the new board, Mr. Jordan said in part:

"With these new men associated with the management, and new money, and a new inspiration to the Jordan selling organization, we anticipate a bright future. While the company is not ready at this time to make public production plans for the future, the coming year should be a great year for Jordan."

CLEVELAND, Oct. 18—J. Paul Zens has resigned as secretary, treasurer and general sales manager of Jordan Motor Car Co.

Marmon Earnings $275,916

INDIANAPOLIS, Oct. 18—Marmon Motor Car Co. earnings in the quarter ended Sept. 30 were $275,916 after charges but before Federal taxes. This compares with $752,080 in the June quarter. Nine months earnings total $1,564,514, a new record. G. M. Williams said demand is being maintained.

Chrysler Schedules 55,000

DETROIT, Oct. 18—Chrysler Corp. is expanding output on some lines and is maintaining capacity operation in all others. The October schedule is for 55,000 cars with a tentative schedule of 51,000 for November.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

NEW YORK, Oct. 18—No substantial increase in trade is generally expected until after the passing of the pronounced Indian summer. The reports of some of the larger industries are cheerful, however, and those of retail trade and jobbers are hopeful.

RETAIL SALES

Sales of 503 retail stores reporting to the Federal Reserve Board were 6 per cent larger last month than a year earlier. Mail order houses reported a similar gain of 24 per cent.

FREIGHT CAR LOADINGS

Car loadings for the week ended Sept. 29 totaled 1,196,768 cars, which marked an increase of 69,865 cars above the figure for the corresponding week a year ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices were 99.4 for the week ended Oct. 13. This compares with 99.2 the week before and 99.3 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended Oct. 10 were 22 per cent above those for the corresponding week last year. However, this large increase was the result of the Columbus Day holiday which fell in the corresponding week last year.

STOCK EXCHANGE

Notwithstanding the comparatively relaxed call money rate, which ranged from 6 to 6½ per cent during the past week, the stock market experienced a slight weakness in the earlier part of the week, and considerable liquidation took place. By the end of the week the market had gained sufficient buoyancy to bring Professor Fisher's index of stock market prices up to 511.7, a new high for the year.

Brokers' loans for the week ended Oct. 10 totaled $4,589,883,000 making a new high for all time. The previous high was $4,569,987,000, which was reached during the week ended Oct. 3.

FEDERAL RESERVE REPORT

The combined statement of the Federal Reserve banks for the week ended Oct. 10 showed decreases of $32,500,000 in discounted bills and of $3,900,000 in holdings of United States Government securities; while there was an increase of $21,800,000 in bills bought in the open market. In the New York district alone there was a decrease of $16,000,000 in discounted bills.

Likewise, this slight contraction of Federal Reserve credit was reflected in the report of the member banks for that week. There were decreases of $32,000,000 in loans and discounts, $45,000,000 in investments, and $30,000,000 in borrowings from the Federal Reserve banks.

Highway Subsidies Protested by R.R.s

Declare Roads Are Used by Buses and Trucks Without Sharing Costs

KANSAS CITY, Oct. 13—The railroads are "out in the open" for a campaign against the use of buses and trucks on public highways.

J. M. Kurn, president of the Frisco System, announced here that the railroads are planning to carry the fight for "legislative protection" to the state legislatures and to Congress. The fight will be on the basis that the use of public highways by buses and trucks "without bearing their proper share of building costs and expense of upkeep" constitutes a "public subsidy," Mr. Kurn said.

"If the states will build and maintain railroads, we too can give cheaper passenger and freight rates," he declared.

In discussing the situation, Mr. Kurn stated that the Frisco railroad, in 1920, received approximately $15,000,000 in passenger fares while the estimate for 1928 is approximately $5,000,000 with the system operating only 500 less passenger miles a day than in 1920.

"The railroads realize," he said, "that the construction of highways is the greatest development that has taken place in the United States in this period, but we believe that bus and truck transportation should be regulated just as stringently as the railroads and should be made to pay their way, just as the railroads."

Mr. Kurn said the "aid of the public" would be sought by the roads in their fight to obtain protective legislation. He said another possible way of obtaining the legislation would be for the railroads to start operating buses and trucks, declaring such would bring "a flood of legislative action that, eventually, would drive the buses and trucks from the public highways." He said this plan, however, would be very expensive for the railroads.

The public also will be appealed to by the railroads on a basis that laws governing the operation of buses and trucks do not properly protect persons in cases of accident.

Discuss Centralized Service

NEW YORK, Oct. 15—About 270 members of the Automotive Service Association of New York met last week for the monthly meeting at the Park Central Hotel. This meeting was largely a fleet operators' meeting, the topic for discussion being Centralized Maintenance. This topic was discusesd at some length, with the aid of lantern slides, by H. V. Middleworth, superintendent of operations, transport department of the Consolidated Gas Co. Morris R. Machol of the Fleet Operators' List Co. also contributed a few remarks to the discussion.

PRR Uses Containers for L.C.L. Shipments

NEW YORK, Oct. 15—The Pennsylvania Railroad has put into service a number of steel containers for less than carload freight shipments. These containers are of the type used by several other railroads and can be lifted bodily from a freight car and placed on specially constructed motor trucks for delivery at destination. This service will be in operation between New York and Philadelphia in both directions within the next few weeks, and will be expanded in the future to meet requirements.

Black & Decker Merges With Domestic Electric

TOWSON, MD., Oct. 15—S. Duncan Black, president of the Black & Decker Mfg. Co., has announced the merging of the Domestic Electric Co., Cleveland, with the Black & Decker company. Domestic Electric manufactures fractional horsepower motors and through the acquisition Black & Decker becomes a self-contained unit manufacturing within its own plant practically all parts and materials entering into its products.

Carl A. Duffner, president and general manager of Domestic Electric since the company was organized, will remain in that capacity. M. H. Spielman will continue as vice-president.

Black & Decker Sales Gain 25 Per Cent

TOWSON, MD., Oct. 13—S. Duncan Black, president of Black & Decker Mfg. Co., report net sales for the quarter ended Sept. 30 as 25.5 per cent larger than for the same quarter last year. Domestic business is well ahead and Canadian and export fields generally also show increased business. Net earnings for the fiscal year ended Sept. 30 were at the rate of $3.35 a share of common stock. Prospects for the coming year were reported bright by Mr. Black.

Durant Output Gains 69%

NEW YORK, Oct. 13—Durant production records during September continued high, breaking the record of September a year ago by 69 per cent, according to announcement just made by officials of the company. This record was made in spite of the fact that it was during this month that the changeover was made from 1928 to 1929 models.

Metal Exchange to Open

NEW YORK, Oct. 6—The National Metal Exchange will open for trading early in November, according to announcement made by Erwin Vogelsang, president.

Tire Inventories Lower September 1

Increases in Shipments Over Production in August Lower Stocks

NEW YORK, Oct. 13—Large shipments of tires and tubes during August resulted in reduced inventories as of Sept. 1 in spite of the increased production, according to the monthly statistics collected by the Rubber Association of America, Inc. This is true not only as compared with the previous month but also as comparison with August 1927 for the group as a whole.

Comparative figures follow:

	Inventory	Production	Shipments
Balloon Casings			
Aug. 1928	4,986,800	3,678,139	3,814,016
July 1928	5,215,331	3,358,203	3,658,636
Aug. 1927	4,231,101	2,209,580	2,413,700
Balloon Inner Tubes			
Aug. 1928	6,614,884	3,474,338	3,655,301
July 1928	6,794,803	3,240,455	3,576,465
Aug. 1927	5,610,329	1,883,417	2,445,670
High Pressure Cord Casings			
Aug. 1928	2,465,358	1,903,345	2,416,386
July 1928	3,039,349	1,506,228	2,207,086
Aug. 1927	3,553,041	2,059,868	2,250,576
High Pressure Inner Tubes			
Aug. 1928	3,833,201	2,783,115	3,357,277
July 1928	4,435,798	1,764,761	2,970,017
Aug. 1927	5,367,289	2,976,393	3,541,012

1927 Tire Output Drops 5.5%

WASHINGTON, Oct. 11—Total production of rubber tires and inner tubes in the United States in 1927 was valued at $779,252,254, a decrease of 5.5 per cent as compared with the year 1925, according to data collected by the Census Bureau at the biennial census of manufactures this year. In 1925, the last preceding census year, the total production figure was $824,548,604. The 1927 total includes more than $1,500,000 in tires and tubes made as secondary products by establishments primarily manufacturing other rubber goods.

Among these statistics tabulated by the bureau are the following: Casings for motor vehicles, excepting motorcycles — 1927, 63,549,949, valued at $633,582,246; 1925, 58,784,073, valued at $656,491,733, being an increase of 8.1 per cent in number and a decrease of 3.5 per cent in value. Inner tubes for motor vehicles, excepting motorcycles—1927, 70,855,455, valued at $105,487,386; 1925, 77,387,836, valued at $118,234,658, being a decrease of 8.4 per cent in number and 10.8 per cent in value.

Bean Spray Changes Name

LANSING, Oct. 15—The name of the Bean Spray Pump Co. has been changed to the John Bean Mfg. Co. to make the name more representative of the complete line of automotive products manufactured. There is no change in personnel or policies. The company now builds car washers, air compressors, air lift jacks and other equipment.

Cunningham Names Allied Executives

New Lamp Combination Will Make Headquarters at Detroit Plant

DETROIT, Oct. 15—Headquarters of the newly formed Allied Products Corp. which has acquired the business of the Victor Peninsular Co., the Indiana Lamp Corp. and the Richards Brothers Die Works, will be at the offices of the Victor Peninsular Co., 4646 Lawton Ave., Detroit, according to R. O. Cunningham, who has been named president of the Allied Products Corp.

Mr. Cunningham, of Ford Bacon & Davis, Inc., has been interested in the operations of the three merged companies for some time, and for the past two years has taken an active hand in the management of the Indiana Lamp company. He announces that officers of the new corporation will be as follows: R. M. Heams, formerly vice-president of Victor Peninsular; O. K. Richard, formerly co-owner of Richards Brothers, and W. F. Thoms, formerly president of Indiana Lamp, will be vice-presidents. These men with Mr. Cunningham and J. F. Towers, vice-president of Ford Bacon & Davis, Inc., with two representatives of bankers, will constitute the board of directors.

In commenting on the activities of the new corporation, Mr. Cunningham emphasized that each one of the units would operate as heretofore and that the personnel in each of the three factories will remain intact.

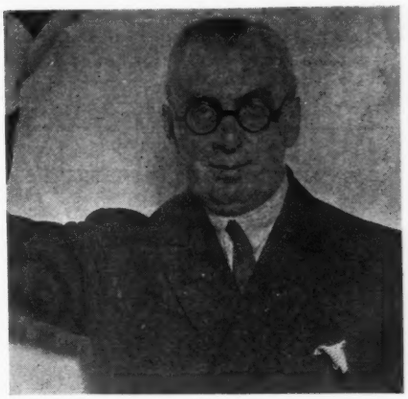
Allied Products Corp. was organized recently under the laws of Illinois to take over the three companies. An issue of 50,000 shares of Class A convertible common stock without par value was recently issued at $50 a share.

American Eagle Aircraft to Build 1200 Annually

KANSAS CITY, Oct. 16—American Eagle Aircraft Corp. has announced a refinancing and expansion program, including a new factory with a capacity for 1200 planes yearly. The new plant will be erected at the Fairfax airport, Kansas City, Kan., and will be ready for occupancy Dec. 15. E. E. Porterfield, Jr., is president, and the directorate includes Barney Oldfield, former racing driver. The company was organized in 1926 and has built and sold more than 400 planes.

Franklin Stages Salons

SYRACUSE, Oct. 15—Sixteen principal cities of the country have been designated by the Franklin Automobile Co., for special salons which will feature the new Airman Limited models. These salons have been arranged by the various Franklin distributors through special factory arrangement.



Here on Visit
Carl Schippert arriving in New York to arrange the showing of the Mercedes-Benz at the National Shows

Companies Increase 3rd Quarter Profits

DETROIT, Oct. 17—Hupp Motor Car Corp. reports net profit of $2,411,330 for the quarter ended Sept. 30 after all charges. This is equivalent to $2.28 a share and compares with $2,667,693 in the preceding quarter and with $440,079 in the September quarter of 1927. Net income for the first nine months was $6,694,551, or $6.63 a share, as against $1,587,902 or $1.58 a share in the 1927 period.

Eaton Earnings $416,280

CLEVELAND, Oct. 17—Eaton Axle & Spring Co. reports net income in the third quarter of $416,280 after charges but before Federal taxes, equivalent to $1.53 a share on 270,000 shares. This compares with $455,634 or $1.82 a share on 250,000 shares in the preceding quarter and with $162,891 in the same quarter last year. Net income for the nine months was $1,187,263 or $4.39 a share as against $742,237, or $2.97 a share, in the same period last year.

Russell to Build in Canada

MIDDLETOWN, CONN., Oct. 16—Russell Mfg. Co. is building a factory at St. Johns, Quebec, to supply the Canadian and British trade with brake lining for replacement. The plant will have 80,000 sq. ft. of manufacturing space. F. J. Daly, formerly assistant service manager at the Chicago branch, has been promoted to service manager at the new Canadian factory.

Ernest A. Stephens

NEW YORK, Oct. 13—Ernest A Stephens, advertising manager and general contact man between the president and factory and sales force of the Dunlop Tire & Rubber Corp., died in Buffalo Oct. 10 of pleurisy. Mr. Stephens had long been prominent in the automotive industry, having been at one time on the editorial staff of *Horseless Age* and *Motor Age* and being the author of several books on automobiles.

Form U.S. Company to Build D.H. Planes

M. M. Baker Heads Moth Aircraft, Organized as Delaware Corporation

NEW YORK, Oct. 13—Moth Aircraft Corp. has been formed under the laws of Delaware to manufacture and sell in this country the D. H. Moth plane of the De Haviland Co. of England. The corporation will have an authorized capitalization of 100,000 shares, participating cumulative and voting $2.50 A stock, of which 30,000 shares are to be issued shortly. The capital structure also calls for 100,000 shares of Class B common stock, of which 65,000 shares are shortly to be issued. Minton M. Baker will head the new concern.

Leases Rauch & Lang Plant

SPRINGFIELD, MASS., Oct. 15—Moth Aircraft Corp., holding manufacturing rights obtained from De Haviland Aircraft, Ltd., has come to an agreement with Rauch & Lang, Inc., to lease half the space of the last-named concern's factory in Chicopee Falls for the manufacture of the Gipsy Moth airplane for the American trade. This decision follows negotiations in progress for several weeks.

The new plant at Chicopee Falls is to be managed by Frank M. Smith, who was commissioned to get a site for the Moth factory. Mr. Smith is treasurer of the Montague Oar & Paddle Co., of Montague City, Mass., which has a contract to deliver wood parts for the plane. Metal for duralumin parts will be delivered from the plant of the Baush Machine Tool Co. in this city. A field of 28 acres adjacent to the factory is available for the testing of planes. Pratt & Co., investment bankers of New York, are underwriting a $2,000,000 bond issue for the Moth company, it is reported here.

Fairchild Drops Vickers, to Build Canada Plant

NEW YORK, Oct. 17—Sherman M. Fairchild, president of the Fairchild Aviation Corp., has announced the discontinuance of the arrangement with Vickers, Ltd., of Montreal, for the manufacture of Fairchild planes in Canada under license. The capitalization of Fairchilds Aviation, Ltd., of Canada, a subsidiary, is being increased, Mr. Fairchild said, and a new factory and flying field are to be built at once. A line of land and seaplanes will be manufactured there.

Buys 3 Oil-Electrics

NEW YORK, Oct. 13—The Donner Steel Co., Buffalo, has ordered three more 300-hp. oil-electric locomotives to be built jointly by the Ingersoll-Rand Co., the General Electric Co., and the American Locomotive Co.

Men of the Industry and What They Are Doing

Brearley New President, Pennsylvania Association

W. H. Brearley, head of the legal department of the Autocar Co., has been elected president of the Pennsylvania Automotive Association. Other officers are: R. W. Shreiner, secretary and treasurer; Claude S. Klugh, manager, and G. A. Hoeveler, G. G. McFarland, J. G. Roberts and J. B. Arbuckle, vice-presidents.

Coler Joins Winningham

Among the recent additions to the staff of C. C. Winningham, Inc., is Ernest Coler, whose experience dates back to one and two-cylinder days, when he was advertising manager of the Maxwell-Briscoe Motor Co. and its subsidiaries. Later he became advertising manager of the Willys-Overland Co., general manager of the Briscoe Motor Co., and business manager of American Motorist. During more recent years, Mr. Coler edited Motor Life.

Merkel and Rohrbach Coming

Otto Merkel, director of the Deutsche Luft Hansa, and Dr. A. K. Rohrbach, owner of the Rohrbach Metal Airplane Co., both of Germany, will attend the International Civil Aeronautics Conference in Washington, Dec. 12 to 14. Osborn S. Watson of the Department of Commerce, has been appointed assistant executive officer of the conference.

Dodge and Quisenberry Speakers

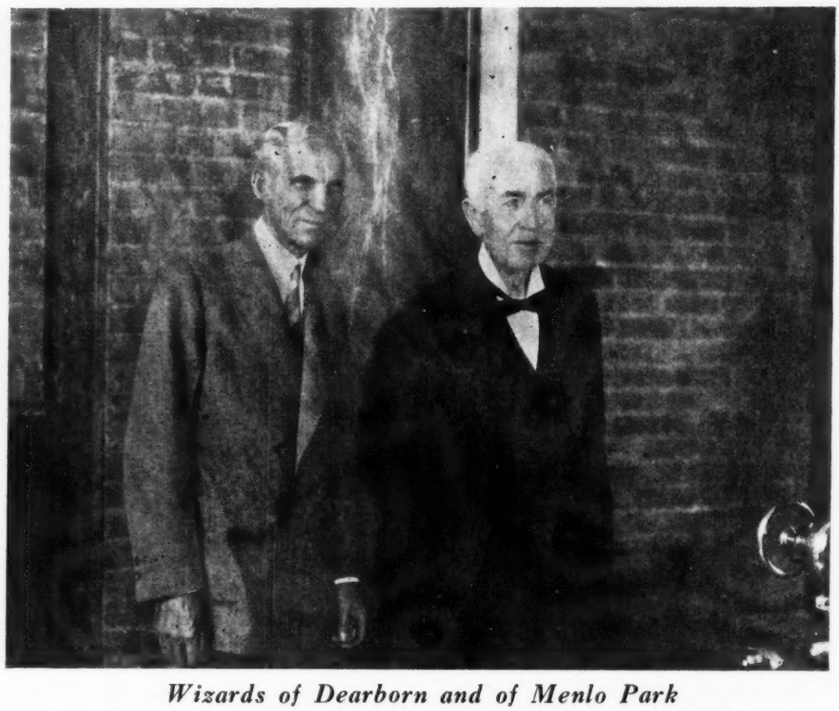
V. A. Dodge of Dodge & Seymour, New York, and George E. Quisenberry, editor of the American Automobile (overseas edition), will be speakers at the export dinner held in connection with the National Standard Parts Association Convention. The dinner will be held in the Hollenden Hotel, Oct. 29.

Williams Milwaukee Speaker

S. D. Williams, of the Timken Steel & Tube Co., spoke at the first meeting of the new season of the Milwaukee Section, Society of Automotive Engineers, held Oct. 10 at the Milwaukee Athletic Club. Mr. Williams discussed "Automotive Steel Making" and illustrated his talk with motion pictures and stereopticon views of the production of steel both by the open hearth and electric furnace methods.

Join Overseas Service

Nelson E. Gage has recently joined the Overseas Motor Service Corp. in an executive capacity. Mr. Gage was formerly with the General Motors Export Co. R. R. Coleman has been appointed supply manager of the Overseas corporation. Mr. Coleman's previous connection was with the Hazeltine Co.



Wizards of Dearborn and of Menlo Park

Henry Ford and his friend, Thomas A. Edison, pose for the camera in the business of dedicating the Ford Museum at Dearborn

Knoff Joins Stutz

Edward M. Knoff, zone manager for Willys-Overland, Inc., in the Memphis territory, has resigned to accept a position in the sales department of the Stutz Motor Car Co. He will be field representative for Stutz in the Ohio territory. Mr. Knoff has been associated with Willys-Overland for more than a year in the Southern district.

Working Succeeds Dearth

R. J. Working has been appointed Cincinnati district sales manager for the Central Alloy Steel Corp., succeeding J. C. Dearth, resigned. Mr. Working formerly was connected with the company's sales headquarters at Massilon, Ohio.

Cox Joins Campbell-Ewald

George W. Cox, well-known in advertising circles, has joined the Campbell-Ewald Co. Mr. Cox was with George Harrison Phelps. He also has been connected with Evans-Winter-Hebb, Inc., Detroit; and Erwin, Wasey & Co., Chicago, in executive positions, as well as with the old Maxwell-Chalmers Corp.

Soper Gardner Zone Head

Fred D. Soper has been appointed manager of the Northern sales division of Gardner Motors Co., Inc. Mr. Soper was formerly connected with the Velie Motors Corp.

Goeke Heads Wisconsin Zone

Paul D. Goeke, who has been associated with the Willys-Overland organization for seven years, has been appointed zone manager of Willys-Overland for the state of Wisconsin, with headquarters at the factory branch office at 110 East Wisconsin Avenue, Milwaukee. He formerly was wholesale manager of the Denver territory, later did special work for the regional office out of Chicago, and more recently devoted his efforts to dealer problems in Minnesota and western Wisconsin, working out of the Minneapolis-St. Paul office.

Chapman With Moon-Chicago

Appointment of C. B. Chapman as Chicago general manager for the Moon Motor Car Co. has just been announced. Mr. Chapman is well-known in wholesale automotive circles, as he has been wholesale manager with the Hudson Motor Co. of Illinois for the past nine years.

DePaola on Reo Sales Staff

Peter DePaola, nationally known automobile race driver and winner of the title of national racing champion of the American Automobile Association, has taken a position with the Reo Motor Car Co. sales promotion department. He will travel throughout the country visiting the many branches of the company.

Steel Mills Prepare New Card of Extras

Hot Rolled Strip List Will Eliminate Base Sizes for 1929 Business

NEW YORK, Oct. 18—While large automotive consumers are known to have covered the bulk of their fourth-quarter requirements of hot rolled strip-steel at third-quarter prices, the impending making-over of the price structure of the hot rolled strip-steel market is attracting wide attention. A new card of extras is reported to have been formulated and to be ready for promulgation. Heretofore strip more than 12 in. in width was quoted at flat prices, based in a large measure on those of sheets and plates of corresponding gage. The new list will provide extras for strip under 3-in. in width as well as that over 12 in. in width, the aim being establishment of a single base price with automatic extras for all widths, the smallest of these extras being .05 cents. There will be no base sizes, each and every width taking an extra.

So far the hot rolled strip industry has shared to a lesser extent in the recent upward swing of the steel market than have other descriptions of steel, and there has been talk of an advance later in the year, provided conditions continued as favorable as they are now. Whether introduction of the new card of extras will hasten such a move remains to be seen. Not only are all of the Mahoning Valley open-hearth steel furnaces operating this week, but nearly all of the sheet and strip and tube mills. Prices are well maintained, except for some shading in the Buffalo steel bar market.

Pig Iron—While No. 2 foundry is quoted at $17, Valley, very little buying would result in raising that price level. For malleable, $17.25 is the inside figure. Producers predict further advances in steel-making grades with the result that foundry metal will move higher in sympathy with basic and Bessemer.

Aluminum—There has been no change in the price situation. Automotive consumption of aluminum, especially in pistons, continues of large proportions. While statistics are unobtainable, a marked increase in consumption by aircraft manufacturers is believed to have taken place this year.

Copper—Shipments to domestic consumers last month aggregated 88,707 tons, approximately 5400 tons more than in the preceding months. The market rules quiet, with producers seemingly satisfied to let prices remain where they are for the time being.

Tin—The feeling is gaining ground that the opening for business of the new National Metal Exchange next month will be the signal for advancing tin prices. The market is marking time for the present.

Lead—The market rules steady and quiet at unchanged price levels.

Zinc—Demand is sluggish, producers maintaining prices at previous levels.

Automotive Plants Pay Labor Most

WASHINGTON, Oct. 18—The highest average entrance wage rate for laborers in any industry is being paid in the automotive field, according to a survey of the Bureau of Labor statistics. The average entrance wage rate for common labor in domestic industries on July 1, 1928, was 44.9 cents per hour. The average wage rate per hour for the automobile industry was almost 10 cents higher than the next highest industry, being 57.2 cents, as compared with 47.4 in the general contracting industry. The lowest average, 31.7 cents, was in the sawmill industry. More than 150,000 firms were circularized in order to obtain these statistics, 42,000 of these firms being general contracting classes and 23,000 being automobile firms.

Loening Aeronautical Merges With Keystone

NEW YORK, Oct. 17—Keystone Aircraft Corp. of Bristol, Pa., and Loening Aeronautical Engineering Corp. of New York, have made arrangements to merge through the exchange of all outstanding shares of the Loening company for shares of the Keystone company.

The Keystone Aircraft Corp., which was organized in 1920, has built up its business primarily as a supplier of military planes for the United States Army and Navy and foreign governments. Its present production consists largely of bombing planes and training planes.

The Loening company has been manufacturing amphibians largely for navy use during the last few years but recently has manufactured a few passenger cabin amphibian planes for commercial use.

The merged organization will complete the development of a large air transport for sale to the rapidly expanding commercial transport lines.

G.M. to Transfer Operations

NEW YORK, Oct. 17—General Motors Export Co. will transfer its continental exports business from Berlin to its Belgian plant following its failure to collect refunds from the German government of duties paid on parts and accessories which were assembled into completed cars for export to other European countries.

Durant Builds Truck Cab

NEW YORK, Oct. 17—Durant Motor Co. is now preparing to furnish a factory-built cab for its Rugby model four-cylinder 1-ton truck chassis at $175.

Financial Notes

Hayes Body Corp. directors have voted to retire the funded debt, consisting of $629,000 of 6½ per cent first mortgage bonds, with $625,000 of preferred stock outstanding. Directors have authorized the issuance of 50,000 additional shares of no-par common stock making a total of 250,000 shares to be outstanding. The new shares will be offered to stockholders at $45 on the basis of one share to every four shares now held. Rights expire Nov. 5. Common is expected to be put on annual $3 basis beginning Jan. 1, 1929, and application will be made for listing on the New York Stock Exchange.

Ross Gear & Tool Co. reports earnings in the third quarter of $263,669 as against $84,927 in the same quarter last year. Earnings in the first nine months this year total $637,631 as against $334,730 in the first nine months last year.. Production in October will be nearly double production in the same month last year. The company reports the closing of several additional contracts for 1929. Replacement sales during the year have been important factors in the increased earnings.

Curtis Mfg. Co. shares totaling 60,000 were oversubscribed when offered publicly at $37 a share. The stock had been owned privately for 75 years. Control of the company will continue to be retained by the Steedman family of St. Louis. The stock is to be listed on the Chicago Stock Exchange. No further public offerings will be made, 70 per cent of the stock continuing in the hands of officers of the company.

Checker Cab Mfg. Corp. has called a meeting of stockholders for Oct. 22 to authorize an increase of common stock from 250,000 to 500,000 shares. It is planned to offer present stockholders right to subscribe to one additional share for each two shares now held. Proceeds from this increased capitalization will be used to take care of increased demand for the company's product.

American Smelting & Refining Co. has purchased majority of Class B stock at $10 a share of the Michigan Copper & Brass Co. This is the second of Detroit's large metal-working plants to pass into new hands, the control of the Detroit Copper & Brass Rolling Mills having gone to the American Brass Co., a subsidiary of the Anaconda Copper Mining Co.

Bendix Corp. as of July 31, 1928, shows total assets of $8,436,350, compared with $6,647,369 on Dec. 31, 1927, and profit and loss surplus of $3,820,033 against $2,553,718. Current assets were $3,415,062 and current liabilities $1,259,390, compared with 1,965,-479 and $784,602, respectively, on Dec. 31, 1927.

Floyd D. Miller

DETROIT, Oct. 16—Floyd D. Miller, office manager of the Nash Motors Co. at Kenosha, and formerly paymaster of the Buick Motor Co. at Flint, died suddenly Sunday at his home in Kenosha. He leaves a widow, one son, Charles Nash Miller, and his mother at Swartz Creek, Mich.

Ohio Retail Sales Lower in September

Decline of 27 Per Cent is Reported in Nine Leading Counties

COLUMBUS, Oct. 15—According to the report of the Ohio Council, National Automobile Dealers Association, sales of new cars in nine of the most populous counties in Ohio during September were 9196, compared with 12,446 in August, a decline of about 27 per cent. The counties contain about three-fifths of the state's population.

Cuyahoga county, containing Cleveland, reported 2769 sales, compared with 4171; Hamilton county, containing Cincinnati, had 1422 sales, compared with 1748; Summit county, containing Akron, had 1049 sales, compared with 1260; Lucas county, containing Toledo, had 947 sales, compared with 1308; Franklin county, containing Columbus, had 1010 sales, compared with 1266; Mahoning county, containing Youngstown, had 560 sales, compared with 761; Stark county, containing Canton, had 581 sales, compared with 819; Montgomery county, containing Dayton, had 689 sales, compared with 871, and Scioto county, containing Portsmouth, had 169 sales, compared with 242.

Hayes Body Takes Over Marmon Body Factory

INDIANAPOLIS, Oct. 15 — Hayes Body Corp. has taken over the body plant here of the Marmon Motor Car Co. and anticipates that Marmon and other business will call for the capacity operation, 250 bodies per day, within the next few months.

The two other plants of the Hayes corporation, at Grand Rapids and Ionia, are working at full capacity producing bodies for Reo, De Soto, Plymouth, Marmon and Willys. The company is enjoying the best year in its history.

Thompson Promotes Engineers

CLEVELAND, Oct. 13—William H. Spire of the Cleveland plant of Thompson Products, Inc., has been named director of engineering, and Richard E. Bissell, chief engineer, it is announced by C. W. Miller, vice-president and general manager. Mr. Spire was formerly chief engineer and Mr. Bissell, research engineer of the company. Mr. Spire has been with Thompson Products, Inc., for 21 years and Mr. Bissell for 10 years.

Rubber Imports Lower

NEW YORK, Oct. 13—Importations of crude rubber during the nine months ended Sept. 30 amounted to 322,346 tons, according to the Rubber Association of America. This compares with 331,383 tons for the corresponding period of last year. Imports during September were 46,662 as compared with 32,798 tons last year.

Tire Tread Design Studied for Wear

WASHINGTON, Oct. 18—Design of the tread on an automobile tire may exert a very marked influence on its wearing quality, particularly as to non-uniform wear, the Bureau of Standards advises. The bureau has just completed a study of the slipping of the tread of pneumatic tires. Results show that the center of a tire slips in one way and the outer edges in another way so that wear is influenced by the tire design. It is believed that a study of tire treads by these means will yield valuable information as to the methods of reducing tire tread wear. A research paper on this proposition has been compiled by the bureau.

Highway Trailer Leases Plant for Body Building

MILWAUKEE, Oct. 15—Three shop buildings of the former Moline Wagon Co. group at Stoughton, Wis., now owned by the city of Stoughton and operated as an industrial community, have been leased by the Highway Trailer Co., Edgerton, Wis., for 10 years to provide more adequate facilities for the production of trailer bodies, steel dump bodies, and motor truck bodies and cabs. Practically the entire body department is being moved from the Edgerton works to Stoughton, which is but a few miles distant. The space thus released at Edgerton will be equipped for increased output of frames, wheels, axles, couplings and other trailer units.

Oilgear Doubles Plant

MILWAUKEE, Oct. 15—To meet the growing demand for broaching machines, presses, pumps, feeds and transmissions so widely used in machine-tool installations in automotive industries and the general metalworking field, the Oilgear Co., Milwaukee, is doubling its capacity. Work is under way on a shop addition, 100 x 180 ft., partly 2-story for office extensions. The improvements will cost upwards of $200,000.

Hydraulic Gets Contracts

CLEVELAND, Oct. 15—The hydraulic pressed steel division of the Truscon Steel Co. has been awarded a record contract for step hangers. The pressed steel division also has received a year's contract for frames from Graham-Paige Motors Corp.

Name Export Representative

TRENTON, N. J., Oct. 15—Trenton Auto Radiator Works has appointed the American Steel Export Co., New York, as foreign sales manager, succeeding Benjamin Hacker, resigned.

California Dealers Take on Airplanes

Movement Toward Combining Car and Plane Business More Active

LOS ANGELES, Oct. 15—Automotive firms are taking a leading part in the development of aviation in southern California and are becoming more and more active in the distribution of airplanes and aviation equipment.

Announcement is just made by Joseph Kreutzer of the reincorporation of his firm which for years has specialized in the servicing of Buick automobiles, to be known as the Joseph Kreutzer Corp., with automotive and aeronautical branches. An airplane factory, aviation school and complete modern airplane motor-repair shop will be established. The field will provide facilities for private and commercial flying transport service.

Herbert R. Miller, Hudson-Essex dealer, announces that he has completed arrangements with the Arkansas Aircraft Corp., manufacturer of Command-Aire biplanes, for the distribution of that ship in California and Arizona.

The Harry Sperl Motors Co., Gardner distributor in southern California, has also established an aviation department, and is distributor of a new plane in this territory.

Maddux, Inc., Los Angeles Lincoln dealers, pioneered in organized air transportation in this section, operating a large number of planes on regular passenger travel schedules between California cities.

The Western Auto Supply Co., operating a chain of automotive retail stores throughout the West, recently announced the establishment of commercial aviation supply departments, and is going after this business in a vigorous manner.

Holland Registry 113,022

WASHINGTON, Oct. 18 — Holland had 113,022 taxable automotive vehicles on June 30, according to recent census figures as reported from the Hague to the Department of Commerce. There were 52,885 passenger automobiles; 27,393 trucks; 3233 buses; 29,177 motorcycles and 334 motor-equipped bicycles. These figures, however, do not actually indicate the total number of vehicles using Dutch roads, since a considerable number of tax-free vehicles are operated by numerous public service institutions.

Timken Buys Weldless Tube

CLEVELAND, Oct. 15 — Timken Roller Bearing Co. has purchased the Weldless Tube Co. of Wosster, Ohio, at receiver's sale. The plant comprises 114 acres of land and has a capacity of 4000 tons of cold drawn seamless tubing monthly, increasing the present capacity of Timken in tubing production by 50 per cent.

Used Cars Active in Mexican Market

Dealers at Texas Border Points Build Up Sales Across Line

LAREDO, TEXAS, Oct. 13—During August 169 cars, containing approximately 1000 automobiles of American manufacture, were exported to Mexico through this port of entry, according to the monthly report of the traffic department of the National Railways of Mexico. Figures have not yet been compiled showing the number of automobiles that entered Mexico through other ports of entry and deepwater ports, but it is estimated that the figures were around 2000, making a total of approximately 3000 automobiles for that month.

An unusually good demand for used cars exists in Mexico at this time, it is stated by dealers. Sales of used cars in that country have become so large that a large business of concentrating such cars at border points in Texas for shipment into Mexico has been built up recently.

The general automobile and motor truck trade in Mexico shows improvement. Highway construction in that country is making slow but steady progress, and with the establishment of a good road system between the larger cities a notable increase of the demand for automobiles will take place, it is expected.

Chicago Sales in August 49.8% Above 1927 Level

CHICAGO, Oct. 13—Sales of new cars in the Chicago Federal Reserve district increased 49.8 per cent in August over August last year but were 0.3 per cent under July. Cars on hand Aug. 31 were 13.1 per cent under the stock of the year before but were 3.3 per cent higher than on July 31. Used car sales showed an increase of 22.1 per cent over the previous August but were 3.3 per cent under July. Stocks of used cars increased 9.2 per cent during the month and were 8 per cent higher than the year before.

National Gauge Builds

LA CROSSE, WIS., Oct. 15—National Gauge & Equipment Co., is rushing work on a two-story plant addition, 130 x 160 ft., and a new boiler house, improvements which will cost about $100,000. Much of the additional area will be used to enlarge the output of the newly developed electric dash gasoline gage.

German Car Stocks Decline

NEW YORK, Oct. 16—Sharp declines in automobile stocks have taken place on the Berlin Stock Exchange in the past week. Since July 1 Daimler stock has fallen from 110 to 84; National Automobile Corp. from 87 to 69, and Neckarsulm from 68 to 32.

Dry Alcohol Found Antidote for Knock

WASHINGTON, Oct. 13 — A dry alcohol claimed to be an ideal anti-knock ingredient for mixture with gasoline is reported to have been developed by a British concern, according to advices received by the Department of Commerce from London. The outstanding feature of the discovery, it is reported, is a process for drying alcohol, perfected in France, whereby the 7 per cent water contents in alcohol is removed at a very small cost so that more than 99 per cent absolute alcohol is obtained which can be mixed with gasoline in any proportion.

Greater Speed and Power Urged for Buses-Trucks

NEWARK, N. J., Oct. 18—Demands for more speed and power in trucks and buses and for curtailment of sales to irresponsible operators were made upon manufacturers of motor vehicles at the transportation meeting of the Society of Automotive Engineers now in progress here. Sessions yesterday were Bus Transportation with Martin Screiber as chairman; Business of Transportation with J. F. Winchester, chairman; Motor Haulage with H. F. Bacon, chairman. Today's sessions were Operation and Maintenance with R. E. Plimpton, chairman, and a symposium on Six Wheel Vehicle Design vs. Legislation with A. F. Masury, chairman.

Cincinnati Car to Act on Merger With Versare

NEW YORK, Oct. 16—Directors of Cincinnati Car Co. have approved a plan for consolidation with Versare Corp. of Albany, N. Y., manufacturer of buses, trackless trolleys and other commercial vehicles. The Versare company is identified with the Rockefeller and Brady interests. A committee of directors of Cincinnati Car Co. has been named to draw plans of consolidation which will be submitted to stockholders.

Wiechers Stover Receiver

RACINE, Wis., Oct. 15—Following the involuntary bankruptcy proceedings instituted against the Stover Signal Engineering Co., Racine, a voluntary petition has been filed in the Federal Court at Milwaukee, schedules admitting liabilities of $84,567 and claiming assets of $47,743. The concern was established several years ago to manufacture, under license, a new type of headlight and a tail-light, stop-light combination for motor cars. John Wiechers has been appointed receiver of the company.

N.J. Law Held Void on Interstate Lines

Chancery Court Rules Mileage Tax Contravenes Federal Constitution

TRENTON, N. J., Oct. 13—Vice-Chancellor Buchanan in an opinion this week in Chancery Court held unconstitutional the law of 1927 which attempted to impose a tax of one and one-half cents a mile upon buses and trucks using New Jersey highways in interstate business as common carriers. In accordance with this finding, the vice-chancellor, at the request of 28 motor vehicle operators, issued an injunction preventing the motor vehicle commissioner from suspending their licenses for non-payment of the tax.

A number of reasons impelled Vice-Chancellor Buchanan to his conclusion that the law is void.

After reciting that by Article 1, Section 8, of the Federal constitution, Congress is given all power to regulate interstate commerce, the court said: "The tax upon the use of highways in interstate commerce is in substance a tax upon the transportation of the goods or persons carried, and is obviously a burden upon such interstate commerce, and an interference with the powers of Congress in that behalf."

Attorney General Katzenbach, who defended the law, pointed out that other complainants carried passengers and that the law was not unconstitutional because it merely attempted to throw upon them some of the tax burden borne by buses doing business strictly within the state. The court, however, declared that even if the tax were lawful for this reason, it would still be void because a suspension of the registrations of the bus owners would deprive them of the right of doing business, and the state, even for non-payment of tax, cannot take away this privilege from persons in interstate commerce.

Added to these reasons the Vice-Chancellor said that the Federal constitution otherwise makes the law invalid because no state may deny to persons the equal protection of the law, in this case the law in question not having equal application to all persons in the same circumstances. It was also pointed out that it is not right to tax common carriers and exempt all other trucks, some of which private carriers are responsible for more wear and tear on the highways than any other vehicles.

Mitchell Erects Addition

PHILADELPHIA, Oct. 16—Mitchell Specialty Co., manufacturer of the Electrolock and of body hardware, this city, is erecting an addition to its factory buildings which will be ready for occupancy Dec. 1 and will increase production capacity 50 per cent.

New England S.A.E. Invites Service Men

BOSTON, Oct. 13—The New England Section, Society of Automotive Engineers, has mapped out a very interesting program for the winter season. Chairman Knox T. Brown called the first meeting this week at the Engineers Club, and following the dinner there was an interesting talk on "Fleet Maintenance," by Secretary William M. Clark. He has charge of the S. S. Pierce Co. motor equipment. Many questions were asked during the discussion period.

Treasurer Albert Lodge spoke on the proposed change in the constitution and the reorganization of the society by divisions. E. B. Conant, of the Fink, Dumont, Brown Co., Inc., demonstrated fire prevention and safety devices for hazardous liquids. William W. Beers, in charge of the motor repair department of the Gulf Refining Co., C. E. Hall, and M. R. Walsh spoke on truck and bus maintenance.

The program for following meetings comprises the following subjects: December, Lacquer Finishes and Chromium Plating; January, Time Saving Devices and Special Equipment; February, Carburetion; March, Wage Incentive to the Mechanic; April, Diesel Engines and Their Late Developments; May, Marine Engines.

Vice-Chairman George L. Appleyard, just before the meeting closed, told the members that they should urge strongly service managers, garage superintendents and others in a supervisory capacity to attend the meetings, pointing out that one did not need to be an engineer to become an associate.

Shirreffs Heads Booster Club

LOS ANGELES, Oct. 15—Automotive Boosters Club, southern California No. 2, has been organized with Jim Shirreffs as president. R. W. Cottle is vice-president; M. H. Klinger, treasurer, and P. W. Battelle, secretary. Directors are Roland Boreham, C. E. Buckmeyer, C. B. Dodge, E. L. Foos and G. F. Grove.

Coming Feature Issue of Chilton Class Journal Publications

Nov. 17—Production and Factory Equipment Issue—Automotive Industries.

Rubber Market Active, London Stocks Decline

NEW YORK, Oct. 15—The rubber market was quite active last week and closed on a firm tone, according to F. R. Henderson Corp. Stocks of crude rubber in London were decreased to 29,525 tons. Arrivals in New York during the first 10 days of October are estimated at 8500 tons, with the probable arrival for the entire month placed at 39,000 tons.

With imminent removal of restriction in British rubber growing areas, bankers and other independent organizations are taking active interest in the rubber situation.

Retail Tire Stocks Larger

WASHINGTON, Oct. 18—The average dealer in automobile and truck tire casings had 62.5 tires on hand Oct. 1, which was 4.9 tires per dealer greater than the stock carried on the same date in 1927, the Department of Commerce announces. According to preliminary statistics reported by 20,307 dealers, the stocks of balloon casings averaged 42.7 per dealer, being an increase of 12 tires per dealer over last year and constituting 45.7 per cent of the total casings on hand. Inner tubes held by dealers averaged 102.7, as on Oct. 1, 1928, compared with 103.1 for Oct. 1, 1927.

Oakland Axle Plant Nearly Ready

DETROIT, Oct. 15—The new axle division of Oakland Motor Car Co., which is necessitating an outlay of about $2,000,000, and will add about 1500 men to the Oakland payroll, will be in full production about Nov. 15.

Business in Europe Better, Says Peter

NEW YORK, Oct. 13—Members of the Overseas Automotive Club heard general business conditions in Europe discussed by Cecil Peter of Black & Decker Mfg. Co. at the regular meeting this week at the Hotel Astor. Mr. Peter told of a motor trip covering several of the important countries of the continent and giving his impression of business conditions throughout Europe generally as showing a vast improvement.

M. Edward, of Johannesburg, South Africa, who represents a number of automotive lines in South Africa and who also is prominent in automotive fields as a writer, addressed the gathering, pointing out conditions as they exist in his territory.

Announcement was made of the program for the annual dinner of the club to be held at the Hotel Stevens, Chicago, Oct. 24, in connection with Automotive Equipment Association show week.

M. L. Heminway, general manager of the Motor & Accessory Manufacturers Association, will speak at this dinner on the subject of building an international automotive industry.

Wallace Thompson, editor of Ingenieria Internacional, will be another speaker, but his subject has not been announced.

An attendance of over 200 is looked for at this dinner, at which visitors from overseas will be guests of the club.

G.E. Orders Gain 17%

SCHENECTADY, Oct. 17—Orders received by the General Electric Co. for the three months ended Sept. 30 amounted to $90,328,666, compared with $77,420,263, for the corresponding quarter of 1927, an increase of 17 per cent, President Gerard Swope has announced. For the nine months ended Sept. 30 orders received amounted to $260,686,463, compared with $233,076,091, for the first nine months of last year, an increase of 12 per cent.

Calendar of Coming Events

SHOWS

Aeronautical Exposition, Coliseum, Chicago .....Dec. 1-9
American Road Builders Association, Inc., Cleveland Auditorium..Jan. 14-18
Automotive Equipment Association, Coliseum, Chicago .....Oct. 22-27
Berlin .....Nov. 8-18
Boston, Mass., Mechanics Bldg...March 2-9
Brussels .....Dec. 8-19
Buenos Aires .....Nov. 29-Dec. 9
*Chicago, National, Coliseum, Jan. 26-Feb. 2
Montevideo .....Nov. 10-19
National Standard Parts Association, Cleveland Auditorium....Oct. 29-Nov. 2
*New York, National, Grand Central Palace .....Jan. 5-12
Paris, trucks .....Nov. 15-25
Salon, Automobile Salon, Inc., Hotel Drake, Chicago .....Jan. 26-Feb. 2
Salon, Automobile Salon, Inc., Hotel Biltmore, Los Angeles .....Feb. 9-16
Salon, Automobile Salon, Inc., Hotel Commodore, New York .....Dec. 2-8
Salon, Automobile Salon, Inc., Palace Hotel, San Francisco...Feb. 23-Mar. 2
Western States Metal and Machinery Exposition, Los Angeles.....Jan. 14-18

*** Will have special shop equipment exhibit.**

CONVENTIONS

Annual Dinner—Overseas Club, Hotel Stevens, Chicago .....Oct. 24
American Road Builders Ass'n, Inc., Cleveland Auditorium .....Jan. 14-18
American Society for Steel Treating, Semi-Annual Meeting, Los Angeles .....Jan. 14-18
Automotive Equipment Association, Coliseum, Chicago .....Oct. 22-27
Chicago Power Exhibition and Conference, Coliseum, Chicago.....Feb. 12-16
International Air Conference, Washington .....Dec. 12-14
Mid-West Motor Truck Transportation Congress, Indianapolis..Oct. 23-26
National Association of Finance Companies, Hotel Roosevelt, New York .....Nov. 20-21
National Automobile Dealers Association, Palmer House, Chicago..Jan. 28-29
National Metal Congress, Los Angeles .....Jan. 14-18
National Research Council, Washington .....Dec. 13-14
National Standard Parts Association, Hollenden Hotel, Cleveland, Oct. 29-Nov. 2

A. S. M. E.

Cincinnati, Oct. 22-25—Machine Shop Practice.

S. A. E.

National

Chicago, Dec. 6-7—Aeronautic.
Detroit, Book-Cadillac, Nov. 22-23—Production.
Detroit, Book-Cadillac, Jan. 15-18—Annual.
Detroit, Oct. 22—Detroit Body Division Meeting.
New York, Hotel Astor, Jan 10—Annual Dinner.
New York, Oct. 25—Metropolitan Section Meeting.